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March 16, 2012

Ms. Carmen Anderson
Voluntary Remediation Program
Indiana Department of Environmental Management
Office of Land Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

Re: Report of Geophysical Survey Investigation
Michigan Plaza Property
3801 – 3823 West Michigan Street
Indianapolis, Indianapolis
MUNDELL Project No. M01046

Dear Ms. Anderson:

MUNDELL & ASSOCIATES, INC. (MUNDELL) is pleased to provide the Indiana Department of Environmental Management (IDEM) with this report documenting geophysical survey investigation activities completed at the above-referenced project site (the "Site") and surrounding areas during 2011. The primary objective of these efforts was to develop a detailed geologic and hydrogeologic interpretation of the surrounding area for the purpose of understanding existing chlorinated groundwater impacts observed not only at the Site, but also in residential drinking water wells located west of the property on Vermont Street and Cossell Road in Indianapolis, Indiana. In particular, this geophysical investigation was intended to provide a more complete understanding of the thickness and distribution of the upper sand and gravel unit in the area and the topographic expression of the base of this unit defined by an upper glacial till unit.

Geophysical field activities were performed by MUNDELL on April 21, August 25, September 14 and 15, October 3 and 4, and November 8, 2011. Additionally, MUNDELL had previously collected a single two-dimensional resistivity profile (cross-section) line on August 19, 2004, which is also discussed in this report. Our documentation of the scope, activities, and findings of this investigation is provided in the following paragraphs.

Background and Scope of Investigation

The area of study includes land near Holt Road and south and west of Little Eagle Creek, and north of Eagle Creek in the vicinity of the project site where previous chlorinated solvent groundwater impacts have been observed. This includes: the Michigan Meadows

Apartment Complex north of the Site, the Site itself (*i.e.*, the Michigan Plaza property), the Floral Park Cemetery south of Michigan Plaza, and the residential area west of Holt Road that includes properties along Vermont Street and Cossell Road. Identified sources of chlorinated solvent releases in the area include the Genuine Site immediately north of Little Eagle Creek and Michigan Meadows Apartments, Allison Plant 12 northwest of this area, and Michigan Plaza.

As part of this investigation, seven (7) resistivity profiles (cross-sections), four (4) seismic refraction profiles and thirteen (13) downhole geophysical logs of selected monitoring wells were collected in this area. An aerial photo of the Site and surrounding area, overlaid with the monitoring well locations and resistivity/seismic line locations is presented as **Figure 1,** The locations of the profile lines were selected to increase the subsurface geologic understanding north and upgradient of Michigan Plaza (from near the Genuine Site through Michigan Meadows Apartments), south and downgradient of Michigan Plaza (through the northern portion of Floral Park Cemetery), and west and cross-gradient of Michigan Plaza (in the direction of the Vermont Street residential homes).

Geophysical Methodologies

The objective of this geophysical survey investigation was to supplement the existing subsurface soil and bedrock stratigraphic information collected during the advancement of previous soil borings with additional high density geophysical data to more accurately map the upper sand and gravel water-bearing unit and top of the upper fine-grained glacial till unit previously identified. In addition, downhole geophysical logging of 13 site monitoring wells that had been installed with portions of the borings blank drilled was completed to supplement geologic descriptions at those locations and to verify the accurate placement of well screens for groundwater monitoring purposes.

The bedrock in this area is composed of mostly interbedded shale and limestone of the Borden Group, with the unconsolidated overburden materials being composed of variable thicknesses of outwash sands and gravels overlying complexly interbedded sand and gravel deposits and glacial tills. To best map the sand and gravel thickness and identify the outwash/till interface, two geophysical methods were selected. Two-dimensional electrical resistivity imaging (2D ERI) was selected as the primary method for mapping this interface, while seismic refraction was used as a supplemental method for detecting its surface, as well as the soil-bedrock interface. Finally, natural gamma and electromagnetic (EM) conductivity logs were collected in the thirteen (13) monitoring wells to provide documentation of the materials in which the well screens were placed relative to the sand and gravel unit being monitored. A brief description of these techniques is presented in the sections below.

Two-Dimensional Electrical Resistivity

Electrical resistivity is one of the most widely-varying of the physical properties of natural materials. Certain minerals, such as native metals and graphite, conduct electricity via the passage of electrons; however, electronic conduction is generally very rare in the subsurface. Most minerals and rocks are insulators, and electrical current preferentially travels through the water-filled pores in soils and rocks by the passage of the free ions in pore waters (i.e., ionic conduction). It thus follows that degree of saturation, interconnected porosity, and water chemistry (i.e., total dissolved solids) are the major controlling variables of the resistivity of soils and rocks. In general, electrical resistivity directly varies with changes in these parameters. Fine-grained sediments, particularly clay-rich sediments such as glacial till, are excellent conductors of electricity, often much better than fresh water found in the pores of sand and gravel. Carbonate rocks (i.e., limestone and dolomite) are very electrically resistive when they are unfractured, but can have significantly lower resistivity values when fractured and/or solutioned, or when interbedded with low resistivity materials such as shale or clay.

For this project, seven (7) resistivity profiles were collected using a SuperSting R8 Resistivity Imaging System manufactured by *Advanced Geosciences, Inc*., using either a Schlumberger (*Line 1*) or dipole-dipole (*Lines 2* through *6* and *2004 Line*) array and a variable number of electrodes and electrode spacings, depending on the resolution required and the area available for data acquisition. *Line* 1 was collected by compiling two electrode spreads into one continuous spread of 89 electrodes, spaced at 3 meters distances (approximately 9.8 feet) along the line. *Lines 2* and *5* consisted of 56 electrode spreads spaced at 3 meters; *Line 3* was composed of a 56 electrode spread spaced at 4 meters (approximately 13.1 feet). *Line 4* and the *2004 Line* consist of 56 electrodes each, spaced at 3.5 meters (approximately 11.5 feet). Finally, *Line 6* consists of 84 electrodes spaced at 2 meters (approximately 6.6 feet). The locations of the 7 profile lines are shown on **Figure 1,** and presented individually as **Figures 2** through **8**.

Once the data were collected, they were downloaded to a computer and subsequently inverse-modeled using the software *Res2DINV v3.58* to obtain an “actual”, true resistivity cross-section of the subsurface. This is obtained through the process of generating a model resistivity cross-section, calculating the apparent resistivity pseudo-section that would result from such a model, and comparing the calculated pseudo-section to the one collected in the field. The model is then altered through a number of iterations until the two pseudo-sections closely match each other with a minimal error. At this point the model is considered to be a reasonable estimation of the true resistivities of the actual subsurface materials.

The resistivity cross sections presented in this report are 2-dimensional representations of the general distribution of electrical resistivity in the 3-dimensional subsurface. There is no unique direct conversion from resistivity values to lithology. However, based on site

knowledge and nearby borings, geometric shapes and relationships of various anomalies, and the observed ranges of resistivity values, reasonable geologic interpretations can be made. Very often an experienced professional interpreter can readily recognize geologic features on these cross-sections.

Seismic Refraction

Seismic refraction utilizes seismic shockwaves that travel downward from the ground surface where they are generated, refract along the boundaries between geologic layers, and return to the surface where they are measured and recorded. Minimally, this type of survey requires three pieces of field equipment: a seismic source (*e.g.*, typically a sledgehammer), a seismic receiver (*i.e.*, a geophone), and a timer (*e.g.*, a seismograph). The specific equipment used for this survey is a StrataView R24, 24-channel seismograph manufactured by *Geometrics*. This unit is a digital recording seismograph designed for refraction and shallow reflection surveys. Up to 24 geophone inputs are stored in digital memory, allowing the seismic wave traces to be inspected and modified before they are printed on the built-in plotter or alternatively, recorded to an internal hard drive for subsequent processing with the on-board computer or an external workstation. The receivers used in this survey are 4.5-hertz (Hz) vertical geophones, connected to the seismograph by two separate, 12-takeout cables.

A typical seismic refraction survey consists of firmly planting the geophones in the ground at an even spacing along a straight line. A seismic impulse (called a “shot,” since explosives have generally been used for larger seismic surveys used in oil and gas exploration) is generated at time, t = zero, then the seismograph records the geophones’ response over time as the seismic wave travels through the subsurface and back up to the geophones. Five shots are typically recorded for each seismic setup, or spread: one short offset at each end, one long offset at each end, and one in the center of the spread.

For this geophysical investigation, four (4) seismic refraction lines were collected using a sledgehammer as the energy source. These lines were designed to be co-linear with the locations of the resistivity *Lines 2* through *5*. The geophone spacing used for each line was the same as the electrode spacing of the resistivity lines, and five shots were generated per spread. As each shot was collected, the operator monitored the geophone responses to ensure the quality of the data being recorded. Upon completing all of the shots, the data were downloaded to a personal computer for processing and analysis.

Downhole Logging

In order to provide confirmation of the geologic conditions in the 13 monitoring wells where a portion of the well was blank drilled (see **Appendix A** for the original, incomplete boring logs, and **Figure 1** for the well identifications and locations), downhole geophysical logging was performed. Geophysical logging consists of techniques that can monitor specific

physical properties that are correlative to geological parameters. These methods can detect the geological materials outside of the well casing and annular fill materials, but can also be influenced by them. As such, borehole geophysical logging essentially provides a composite image of annular fill materials and the surrounding native geological materials.

MUNDELL collected downhole geophysical logs from the wells in question using a portable MGX system manufactured by the Mount Sopris Instrument Company in Golden, Colorado. This system is a digital, single-channel system designed primarily for shallow environmental and engineering studies. The logging system consists of two primary components. The first is the integrated logging control unit, which remains at the surface with the equipment operator, and the second component is the downhole-logging probe. The control unit is joined physically and electronically to the chosen downhole probe with a steel cable, approximately 600 feet in length, containing a single insulated signal wire. The steel cable is spooled on an integrated electric winch mechanism. The downhole position of the probe is measured to a precision of 0.01 feet with a digital odometer. The electrical signals transmitted by the downhole probe are passed from the winch to a signal processor within the logging unit. The processed digital data include the probe depth, speed, and the probe-specific measurements of the borehole. Data are recorded in a portable computer for real-time viewing, and storage for later analysis.

The geophysical probes used on this project include: 1) a natural gamma probe, and 2) an electromagnetic (EM) conductivity probe. Data from these probes were collected in a near-continuous manner as the probe was either lowered or raised in the borehole at a near-constant speed of 10 to 15 feet per minute depending on the probe. The following subsections describe these two techniques.

Natural Gamma Probe

A Mount Sopris HLP 2375/S natural gamma probe was used to provide information both about the geological conditions and some of the annular fill materials (sand pack and bentonite seal). The HLP 2375/S probe is a high sensitivity scintillometer that measures the gross natural gamma ray count. It has a relatively large sodium iodide crystal that optimizes the instrument sensitivity to the types of gamma rays generally encountered in annular fill, as well as other sedimentary materials. The data are presented in units of gamma ray counts per second (cps). Typical annular fill materials include grout, bentonite seal, granular filter materials for the screened interval, and possibly other objects such as metallic centralizers. Generally, materials such as bentonite and bentonite/cement grout emit a moderate to large amount of natural gamma rays. Most natural gamma ray emissions are caused by minerals containing potassium, uranium, and/or thorium. Clay minerals (which contain the radioactive isotope potassium-40) are generally the most commonly observed natural gamma emitters, and bentonite (which is a potassium-bearing clay mineral) can emit a significant amount of natural gamma rays. In contrast to bentonite,

clean quartz sand, which is usually used as the filter material, emits virtually no gamma rays, and the difference between the sand pack and the overlying bentonite seal in monitoring wells is generally very pronounced. Often times, the same principle can also be used to differentiate between differing geologic layers. The gamma logs are presented in **Appendix B**.

EM Conductivity Probe

A Geonics EM39 electromagnetic conductivity probe was used to provide information on the geologic materials outside the annular space, annular fill materials, and also to identify evidence of metallic objects such as centralizers, double well casings, or other metallic objects.

The operating principal for the EM39 probe is that the intensity of an induced secondary electromagnetic field is directly proportional to the electrical conductivity of materials such as rocks, soils, and fresh water. In fresh water environments, clay-rich sediments generally have higher electrical conductivity than do sands because there are layers of unbound cations and anions adsorbed to the outer surfaces of the clay minerals. In the presence of electrical current, these cations and anions are free to move and carry the electrical current.

The EM39 transmits a high frequency electromagnetic wave from a coil located at one end of the probe. At the other end of the probe is a receiver coil that detects the primary and secondary electromagnetic fields. The transmitted wave passes outside the well and into the formation to a distance of about three feet from the center of the hole. In the presence of a completely non-conductive medium, the receiver will only receive the primary transmitted wave. As the conductivity of the medium increases, the primary wave induces alternating electrical current flow in the formation that is of the same frequency as the transmitted wave. This induced current in turn creates a secondary magnetic field that the receiver also picks up. As the conductivity of the material increases, the strength of the secondary field also increases in a linear manner. This linear relationship breaks down in the presence of highly conductive materials such as steel casing (note that metal objects will register as negative or out-of-scale values) or centralizers. This probe outputs electrical conductivity in milliSiemens per meter (mS/m). The conductivity logs are presented in **Appendix B**.

Results of Geophysical Survey

Seven (7) resistivity and four (4) seismic profiles were collected to characterize the subsurface geology for this project (see **Figure 1** for the specific locations), and they are presented individually as vertical cross-sections in **Figures 2** through **8,** and overlain on the area map on **Figure 9**. The locations of borings/monitoring wells within about 50 ft of these geophysical profile lines are shown projected onto the profile lines in these figures for

informational purposes. Based on the resistivity results, it is apparent that the subsurface conditions underlying the site and surrounding area are fairly complex, with different conditions observed over distances of less than a hundred feet. However, while there is a great deal of variability among different profiles, they all show a similar general pattern:

- an *upper layer* of moderate to high resistivity (90 to 1,000 ohmmeters, *i.e.* yellow to purple in color) which ranges in thickness from approximately 16 to 55 feet;
- a *middle layer* of low to moderate resistivity (0 to 90 ohm-m, i.e. blue to green in color) which ranges in thickness from close to 0 to over 70 ft, with an average thickness between 40 to 65 feet, interbedded with small pockets of moderate to high resistivity material;
- A *lower layer* of intermixed low to high resistivity values.

Utilizing the existing subsurface information gathered in nearby borings, the general geologic pattern of these profile cross-sections is interpreted to be:

- Near surface, shallow sand and gravel outwash materials;
- Intermediate, fine-grained glacial till sediments made up of mostly silt and clay, which are intermixed with small pockets of varying amounts of sand, gravel, or regolith (note: lesser amounts of coarse-grained materials yield lower resistivity values while higher quantities yield higher resistivities); and
- At depth, an interbedded limestone/shale bedrock (with higher resistivity values indicating more limestone and lower resistivity values indicating more shale).

To determine the top of till and top of bedrock using seismic refraction, a three-layer model was used. The seismic velocities for the upper outwash layer ranged from 310 to 420 meters per second (approximately 1,010 to 1,380 feet per second). These velocities are consistent with sand and gravel. In contrast, the velocities of the glacial till layer ranged from 1,450 to 2,300 meters per second (approximately 4,760 to 7,540 feet per second), which is consistent with greater concentrations of fine grained soils. Finally, the bedrock layer, interpreted to be mostly composed of interbedded limestone and shale, ranged from 2,550 to 5,000 meters per second (approximately 8,360 to 16,400 feet per second). This range is consistent with interbedded limestone (3,500 to 6,500 meters per second) and shale (1,800 to 4,000 meters per second), with more weathered areas or areas containing more shale, having lower velocities.

Using the aforementioned seismic model and seismic velocities (where gathered – *Lines 2* through *5*), as well as the resistivity data (with the exception of *Line 1*, where electrical interference along the roadway added a certain amount of background 'noise' into the data and made accurate selection along the entire profile more difficult), an interpreted top of till (dotted-black lines) surface was generated for the Profile Lines (see **Figures 2** through **8**). Additionally, the seismic data was used to generate a top of bedrock (white-dashed lines)

surface on *Lines 2* through *5* as well. These interpreted surfaces have been overlaid on top of the resistivity cross-sections.

In general, the outwash-till interface (black-dotted line) is clearly seen on the seven resistivity profile lines (see **Figures 2** through **8**): the interpreted till surface typically closely mirrors the resistivity data (top of glacial till equals the boundary between yellow and green, *i.e*. 90 ohm-meters), which indicates a good correlation between the seismic and resistivity data. This interpreted surface is also consistent with most of the actual field data obtained from nearby soil borings and monitoring wells that were located in close proximity to the profile lines. As indicated in **Table 1**, which provides comparisons between the measured top-of-till surface at boring/monitoring well locations within about 50 ft of a resistivity/seismic profile line and the prediction made by the geophysical data itself along the profile line (as indicated by the black-dotted line), predicted top-of-till elevations for the 21 borings near the profile lines are typically within about 1 to 3 ft of the actual depth, with an average error of +/- 1.00 ft. Considering the till surface may vary by over 40 ft (from about El 665 to El 705) within the area studied, this indicates that the geophysical data provided a good prediction of the top-of-till surface over the range of variation observed.

It should be noted that the greatest variation between predicted and actual top of till elevations is along north-south Profile Line 2 near Holt Road. The geophysical data indicate a till surface 'high', whereas the boring data, which is about 20 ft from the line, indicate a deeper till surface (*e.g*., at MMW-P-14D, MW170D, EB-2). It should be noted that the 'potential' slope of the till surface in this area (as predicted by the geophysical data) is about 0.4 feet vertical change per foot of horizontal change, or, in other words, it may vary by as much as 21 ft vertically over a distance of 50 ft horizontally. Since the borings are a distance of about 20 ft from the line, this could explain the discrepancy. Since significant variations in the geologic character of the subsurface were observed along Profile Line 2 (see **Figure 3**), additional subsurface data west of this area, including the recently completed U.S. EPA study, will need to be used to provide data to develop further interpretations of the actual conditions.

Given the correlation between the predicted and actual top-of-till surface, the resistivity data may be used as a good approximation of the top of till surface on the *2004 Line* and Line *6* (**Figures 7** and **8**, respectively), where no seismic data was acquired. However, while the resistivity and seismic data correlates well in regards to the top of the glacial till surface, the correlation with the bedrock surface is more difficult. This is due to the variability in the actual bedrock material present beneath the overlying unconsolidated deposits along those profile lines (*i.e*., the interbedded limestone or shale) and the similarity between the magnitude of the resistivity for sand/gravel and limestone and silty clay and shale. Therefore, no attempt was made to interpret a top of bedrock surface based on the resistivity data alone on these profile lines.

Downhole Logging

Thirteen (13) EM conductivity and natural gamma downhole logs were collected from monitoring wells across the site where a portion of the well was blank drilled (see **Appendix A** for the original, incomplete boring logs). The locations of these wells are shown on **Figure 1** (denoted in red), and the logs are presented as **Appendix B. Table 2** summarizes the characteristics of the wells logged (blind drilled intervals, screen intervals, and depth of the geophysical log). While several thin, shallow clay lenses were detected in a few of these logs, the data suggest that the upper 20 to 45 feet of the subsurface is composed mostly of low-conductivity, low-natural gamma yielding sand and gravel, which is consistent with the resistivity data in the vicinity of the wells logged. As such, the wells were shown to be screened within the appropriate sand and gravel unit above the top of till layer and are, therefore, suitable for providing groundwater quality monitoring data.

Top of Glacial Till Map

After the individual resistivity cross-sections had been generated, the interpreted top of glacial till surface from the individual profiles was digitized and used in conjunction with all applicable soil boring and remediation injection logs to generate a top of glacial till topographic map for the area, which is presented as **Figure 10A**. Two characteristics of the glacial till surface are of key interest for aiding the interpretations of the source and trajectory of impacted chlorinated solvent groundwater, especially coming into the Michigan Plaza and leaving the Plaza property: 1) the immediate slope of the till surface near the Plaza, especially between the Michigan Plaza chemical source areas and the Vermont Street residences, and 2) the presence of any depressions or troughs in the till surface that may affect the general direction of groundwater flow in the deeper portion of the sand and gravel unit.

As indicated in **Figure 10A**, the till surface is relatively flat beneath the Michigan Plaza property and in the vicinity of the three chemical source areas. The till surface ranges from about elevation EL 675 to 680. Between the Plaza and Holt Road in the direction of the Vermont Street residents, the till surface remains relatively flat to the southwest and then begins to slope upward east of Holt Road. Directly west of the Plaza, the top of the till surface slopes upward and changes in elevation by as much as 20 ft, reaching near EL 700 east of Holt Road. Southeast of the Plaza, the till surface slopes downward to the southeast. These results support the conclusion that if the original releases of PCE had been significant enough at the Plaza to result in the solvent sinking through the entire upper sand and gravel unit to the till surface (and there is no evidence that they were), and pool on the surface in the form of a dense nonaqueous phase liquid (or DNAPL), this pure-phase liquid would not move in the direction of the Vermont Street residents. As such, this mechanism for the Plaza impacting the residential wells is not possible.

The mapped till surface data (combined with the horizontal resistivity 'slice' map of **Figure 11**, discussed in the next paragraph) clearly show several areas of higher resistivity troughs or incised valleys in the till surface, that could be acting as preferential pathways for the movement of deeper sand and gravel zone groundwater impacts. First, depressions in the till can be seen trending north to south, passing through the *2004 Line* between electrodes 9 to 13, and 16 to 28 (**Figure 8**); through *Line 6* between electrodes 1 to 14, 28 to 32, 37 to 42, and 52 to 58 (**Figure 7**); through *Line 5* between electrodes 18 to 26, to the west of Michigan Plaza (**Figure 6**), and finally through *Line 4* between electrodes 15 and 17 southwest of the Plaza, and Electrodes 31 to 34 near the southwest corner of the Plaza property (**Figure 5**). Additional depressions in the glacial till can be seen trending west to east across Holt Road, just south of *Line 6*; as well as one trending as west to east across Holt Road through *Line* 2 between electrodes 20 and 23 (**Figure 3**). These features are denoted on **Figure 10A** by red-dashed lines with arrows pointing in the downgradient direction.

Of significant interest in **Figure 10A** is the 'character' of the till surface observed between the Genuine Site to the north and the Plaza property. The data indicate that chlorinated solvent impacts 'enter' along the northern property line from the Genuine Site within deeper portions of the sand and gravel unit 'cut' into the surface, near about El 665 (see **Figure 8** previously described). As these deep groundwater impacts move to the south, portions of the top of the till surface rise in four 'knob-like' features, shown along *Profile Line 6* (**Figure 7**). These fine-grained 'hills' in the till surface act as barriers or impediments to the natural southerly flow of the deeper groundwater, and force the deeper groundwater to move 'around' these barriers. This behavior is shown in a conceptual site flow model for the Michigan Meadows Plaza and Apartment property illustrated in **Figure 10B**.

In **Figure 10B** the locations of these four 'knob' feature areas, which rise above El 685, are highlighted with brown-color filled contours when their elevation rises over about El 685, or 20 ft above the original base floor of the deeper impacted sand and gravel along the northern property line. The 'lower elevation' deep groundwater has been highlighted 'aqua' when the elevation of the top of till dips below El 670. As these deeper groundwaters pass around these 'hills' in the till surface and move south of *Profile Line 6*, they encounter two additional till 'ridges' near Michigan Street, and are directed around them by either following the low elevation troughs in the till surface (the deeper portions again highlighted in aqua), or the hydraulic paths of least resistance to normal hydraulic gradients. As shown by the blue 'arrows' indicating deep ground water flow direction in **Figures 10B,** this results in the deeper groundwaters north of Michigan Plaza being directed into three distinct areas south of Michigan Street:

1) *East of Michigan Plaza* – to the southeast between monitoring wells MMW-P-08 and MW-168S/D near previously identified ***Source Areas B*** and ***C*** (see main report) east of the eastern property line of Michigan Plaza;

2) *Immediately West of Michigan Plaza* – to the south, passing beneath Michigan Street through a north-south aligned till trough located near monitoring well MW-167S/D, and then near the western property line of the Plaza and to the southeast; and

3) *Further west of Michigan Plaza* – to the southwest, crossing Holt Road near its intersection with Michigan Street. This pathway is immediately west of a lower ridge feature, and can be more easily seen on the horizontal resistivity slice map (**Figure 11**) discussed below. This pathway includes deep groundwater moving southward parallel to Holt Road and within the Vermont Street residential area.

Deeper groundwater flow directions south of Michigan Street continue to be influenced by the slope and character of the till surface. As indicated in **Figure 10B**, flow east of the Plaza is to the southeast and unaffected by the slope and elevation of the till surface since it is in the direction of the natural hydraulic gradient and there are no till 'ridges' to redirect flow. Groundwater flow immediately west of the Plaza property is directed through a till trough area shown to be present along both *Profile Line 5* (**Figure 6**) and *Profile Line 4* (**Figure 5**). This trough is aligned in a north-south direction, and flow south of the Plaza begins to follow the natural groundwater flow direction to the southeast.

Further to the west, the deeper groundwater flow has been directed to the southwest around a till 'hill' located immediately southeast of the intersection of Holt Road and Michigan Street. This deeper groundwater then flows in a southerly direction, having passed to the west of Holt Road, until it takes the path of least resistance (*i.e.*, the lowest hydraulic gradient) to the southeast, which appears to occur in the vicinity of a till surface low south of monitoring well MW-170D near soil boring EB-2. Deeper groundwater flow then flows unaffected to the southeast.

It should be noted that all of these groundwater flow directions in the deep sand and gravel unit shown on **Figure 10B** are not just theoretical constructions, but have been confirmed by recent (1st Quarter 2012) groundwater gauging events that include the additional recent deep wells installed by MUNDELL, and additional wells by ENVIRON (see 2012 shallow and deep groundwater potentiometric surfaces shown on **Figures 16** and **17** in the main report). In addition, inspection of most recent (October 2011) cis-1,2-DCE and vinyl chloride plume maps for the deeper sand and gravel indicate the relative position of these plumes are consistent with the groundwater flow directions observed and the detailed geologic mapping of the lower till surface. As additional subsurface information west of Holt Road is

provided by the EPA study, it will be incorporated into these Michigan Plaza conceptual site flow models to refine the interpretations of the local flow conditions.

Horizontal Slice Map

In addition to the top of glacial till map, MUNDELL has generated a key horizontal resistivity 'slice' map (*i.e.*, a map of the resistivity at a constant topographic elevation) for elevation 670 feet by combining the individual resistivity cross-sectional values into a three-dimensional data set, and taking a slice at that particular horizontal interval. Elevation 670 feet was selected as significant, as this interval is located within the glacial till across about half of the site and surrounding area, and thus, shows the locations where permeable sand and gravel materials are likely present within 'valleys' or 'troughs' (shown as red-dashed lines) cut into the basal till. This map is presented as **Figure 11**.

The orientation and distribution of the deeper sand and gravels that fill these lower topographic features in the till can be seen by noting their presence shown in yellows and reds. These deeper higher permeability flow pathways correlate well with the top of till contours (**Figure 10A**), and recent potentiometric data collected for the deeper portion of the upper sand and gravel unit. Again, this correlation supports the conclusion that the surface character of the till (as well as the presence of outwash channels within the till) is controlling the deeper groundwater flow north of Michigan Street, especially in areas with the presence of 'knobs', 'ridges', 'hills', 'valleys' and 'troughs which either create resistance to groundwater flow or enhance groundwater flow, both of which have the effect of directing groundwater flow around or through these features.

It should be noted that the geophysical and boring data density collected is much greater east of Holt Road, and, as such, likely results in a much closer description of the subsurface conditions actually present in this area . Once the additional data collected by the U.S. EPA west of Holt Road in late 2011 is received, the interpretations made in **Figures 10A**, **10B**, and **11** can be updated to refine the conceptual models presented for this region.

Limitations

The results and interpretations of the geophysical survey performed are considered generally reliable and were conducted in a manner generally consistent with practitioners in the field of geophysical engineering. The data presented, used in conjunction with available soil boring data or future drilling activities, are considered to be of sufficient accuracy and precision to improve the evaluation of and provide a basis for a more detailed analysis of the subsurface geology and hydrogeology of the area studied. As additional subsurface information becomes available, it will be reviewed and incorporated into the existing body of information and the conceptual site flow models presented in this report.

We appreciate the opportunity to provide you with this geophysical survey. If you should have any questions, please do not hesitate to contact us at 317-630-9060.

Sincerely,
MUNDELL & ASSOCIATES, INC.

Gabriel Hebert
Project Geophysicist

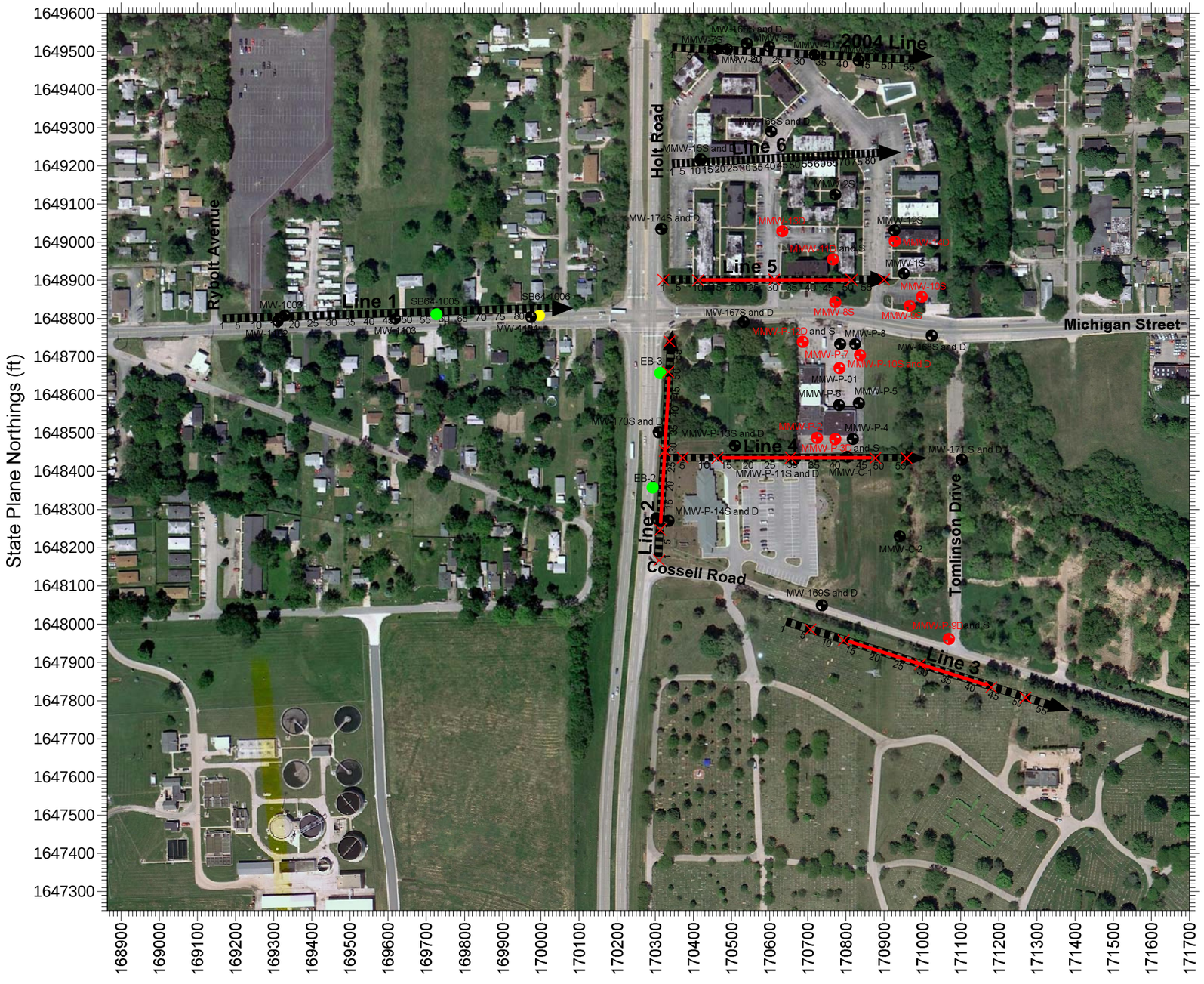
John A. Mundell, P.E., L.P.G.
President/Director of Geophysical Services

/jam

cc: Mr. Peter Cappel, AMMH

Attachments:

Figure 1.	Site Map
Figure 2.	Resistivity Profile Line 1
Figure 3.	Resistivity and Seismic Profile Line 2
Figure 4.	Resistivity and Seismic Profile Line 3
Figure 5.	Resistivity and Seismic Profile Line 4
Figure 6.	Resistivity and Seismic Profile Line 5
Figure 7.	Resistivity Profile Line 6
Figure 8.	2004 Resistivity Profile Line
Figure 9	Site Map with Resistivity Profiles
Figure 10A.	Top of Till Map from the Geophysical and Boring Data
Figure 10B.	Michigan Meadows Plaza and Apartments Conceptual Site Flow Model for the Deep Sand and Gravel Unit
Figure 11.	Resistivity Slice Map (670 Ft. Elevation)
Table 1.	Comparison of Actual and Predicted Top-of-Till Elevations
Table 2.	Summary of Monitoring Wells with Downhole Geophysical Logging Completed
Appendix A	Boring/Well Logs
Appendix B	Geophysical Well Logs



Seismic Line Location

Seismic Shot Location

Resistivity Line Location

Monitoring Well Location with Geophysical Log

Monitoring Well Location

N

Scale in Feet

0 100 200 300 400 500

1" = 300'

Mundell
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REV.	DATE	DESCRIPTION	BY	APPR.

PROJECT NO.: M01046		FILE NO.: 2011 Resistivity.srf	
DRAWING:		PLOT SIZE:	11"x17"
DRAFTED BY:	GJH	DATE:	12/05/11
CHECKED BY:	GJH	DATE:	12/05/11
APPROVED BY:	JAM	DATE:	12/13/11

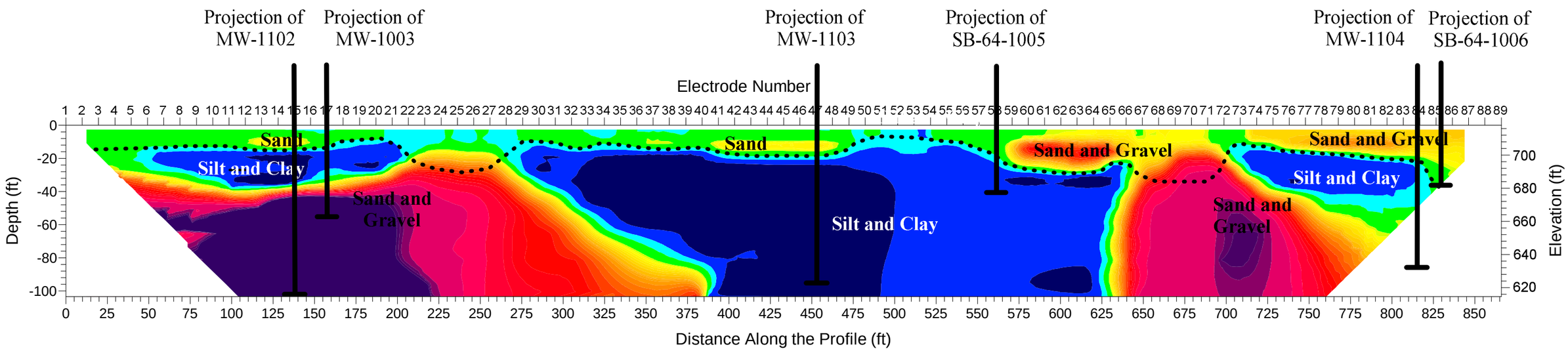
Site Map

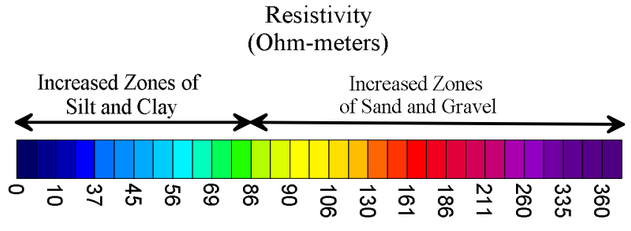
Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

FIGURE
1

WEST

EAST





Interpreted Top of the Till from the Resistivity Data

Projected Location and Depth of Nearby Wells and Borings Along the Profile Line

PROCESSING STATISTICS
Number of Iterations: 5
RMS Error: 16.1%
Total Number of Data: 853
Maximum Misfit: 85%

Resistivity Profile Line 1

Michigan Street
Indianapolis, Indiana
MUNDELL Projectl No. M01046

FIGURE
2

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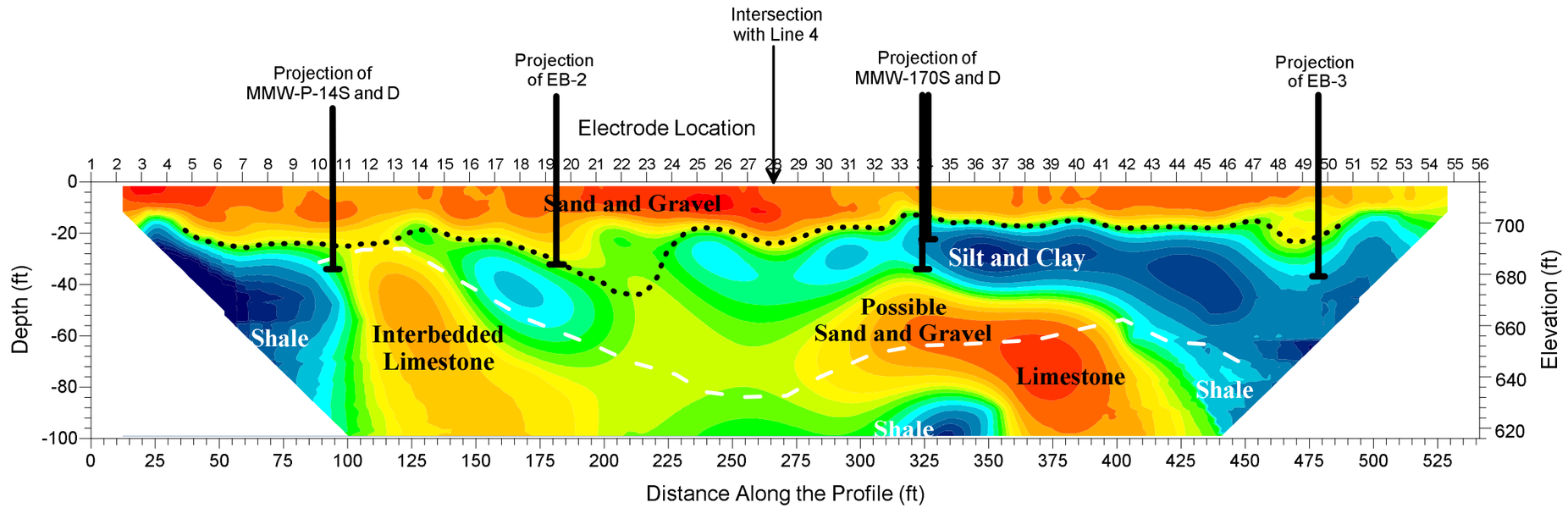
SOUTH

NORTH



PROCESSING STATISTICS
Number of Iterations: 3
RMS Error: 8.25%
Total Number of Data: 643
Maximum Misfit: 32%

Resistivity
(Ohm-meters)

Increased Zones of Silt and Clay (Shallow); Shale Bedrock (Deep)

Increased Zones of Sand and Gravel (Shallow); Limestone Bedrock (Deep)

-100 0 5 10 15 20 30 40 50 60 70 80 90 100 125 150 200 300 400 500 750 1000

Interpreted Top of the Till from the Resistivity and Seismic Data

Projected Location and Depth of Nearby Wells and Borings Along the Profile Line

Top of Bedrock From Seismic Data

Resistivity and Seismic Profile Line 2

Holt Road
Indianapolis, Indiana
MUNDELL Projectl No. M01046

FIGURE
3

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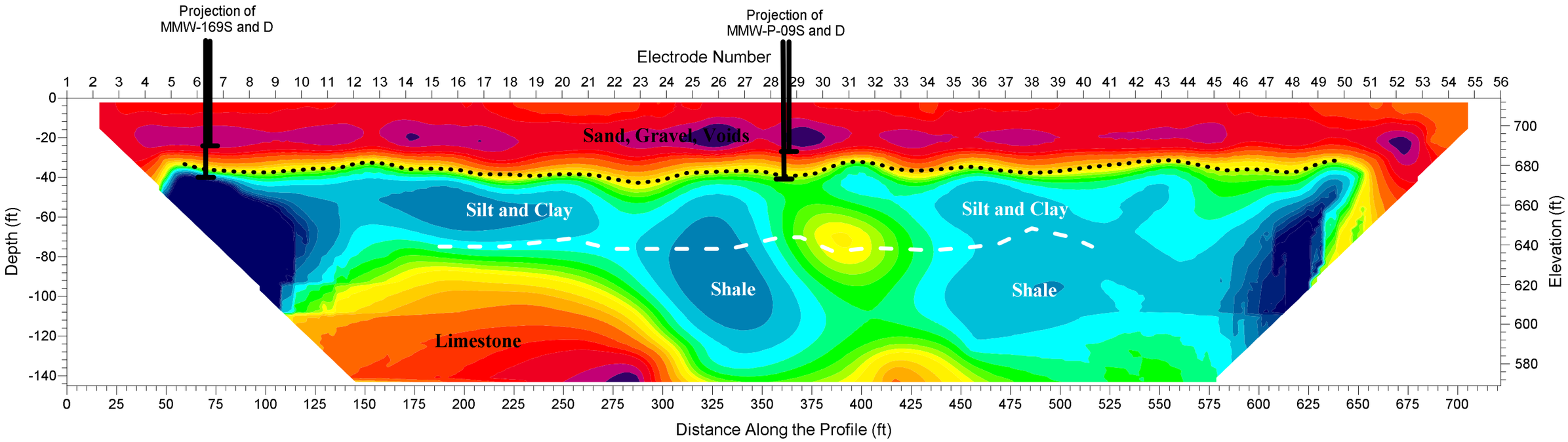
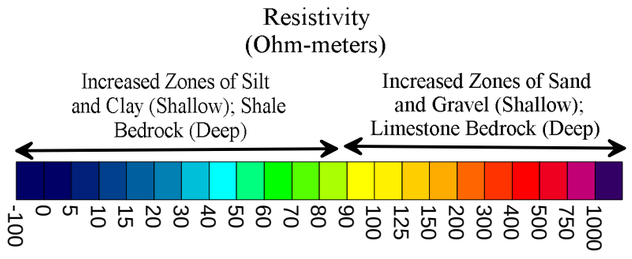
NORTHWEST **SOUTHEAST**



PROCESSING STATISTICS
Number of Iterations: 6
RMS Error: 7.34%
Total Number of Data: 681
Maximum Misfit: 30%



Interpreted Top of the Till from the Resistivity and Seismic Data

Top of Bedrock From Seismic Data

Projected Location and Depth of Nearby Wells and Borings Along the Profile Line

Resistivity Profile Line 3

Floral Park Cemetery
Indianapolis, Indiana
MUNDELL Projectl No. M01046

FIGURE
4

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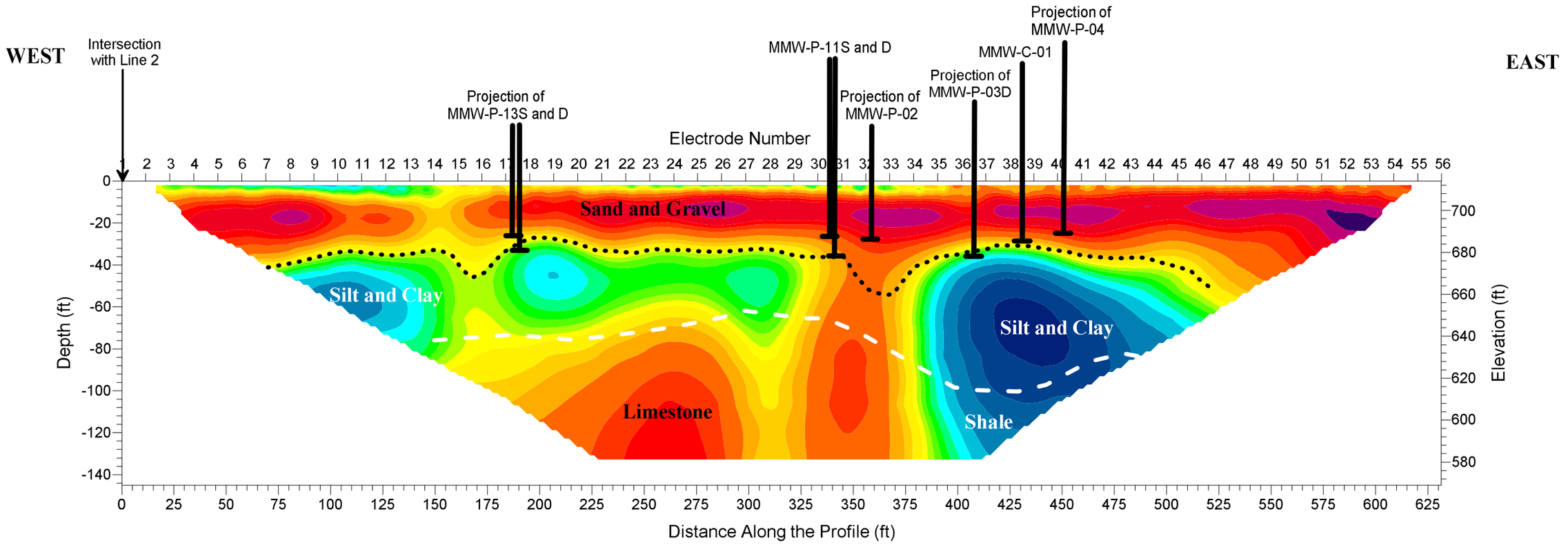

PROCESSING STATISTICS
Number of Iterations: 6
RMS Error: 10.2%
Total Number of Data: 645
Maximum Misfit: 39.5%

Resistivity
(Ohm-meters)

Increased Zones of Silt and Clay (Shallow); Shale Bedrock (Deep)

Increased Zones of Sand and Gravel (Shallow); Limestone Bedrock (Deep)

-100 0 5 10 15 20 30 40 50 60 70 80 90 100 125 150 200 300 400 500 750 1000

Interpreted Top of the Till from the Resistivity and Seismic Data

Projected Location and Depth of Nearby Wells and Borings Along the Profile Line

Top of Bedrock From Seismic Data

Resistivity Profile Line 4

Floral Park Cemetery
Indianapolis, Indiana
MUNDELL Projectl No. M01046

FIGURE
5

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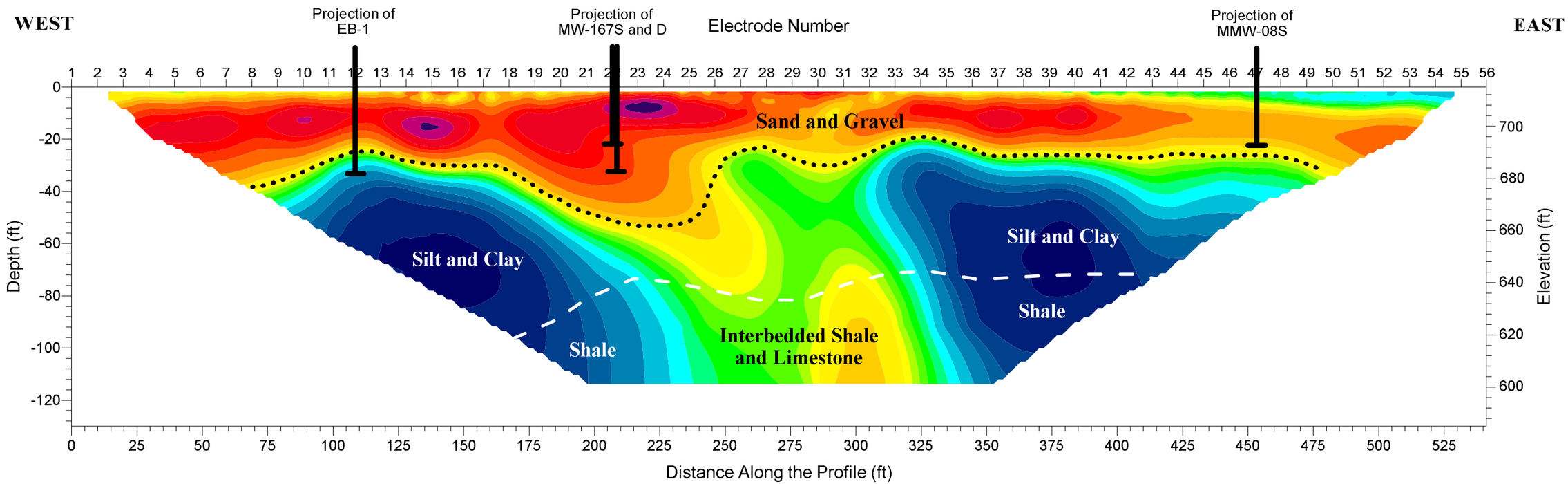

PROCESSING STATISTICS
Number of Iterations: 6
RMS Error: 11.94%
Total Number of Data: 644
Maximum Misfit: 39.9%

Resistivity
(Ohm-meters)

Increased Zones of Silt and Clay (Shallow); Shale Bedrock (Deep)

Increased Zones of Sand and Gravel (Shallow); Limestone Bedrock (Deep)

-100 0 5 10 15 20 30 40 50 60 70 80 90 100 125 150 200 300 400 500 750 1000

Interpreted Top of the Till from the Resistivity and Seismic Data

Top of Bedrock From Seismic Data

Projected Location and Depth of Nearby Wells and Borings Along the Profile Line

Resistivity Profile Line 5

Michigan Plaza Apartments
Indianapolis, Indiana
MUNDELL Projectl No. M01046

FIGURE
6

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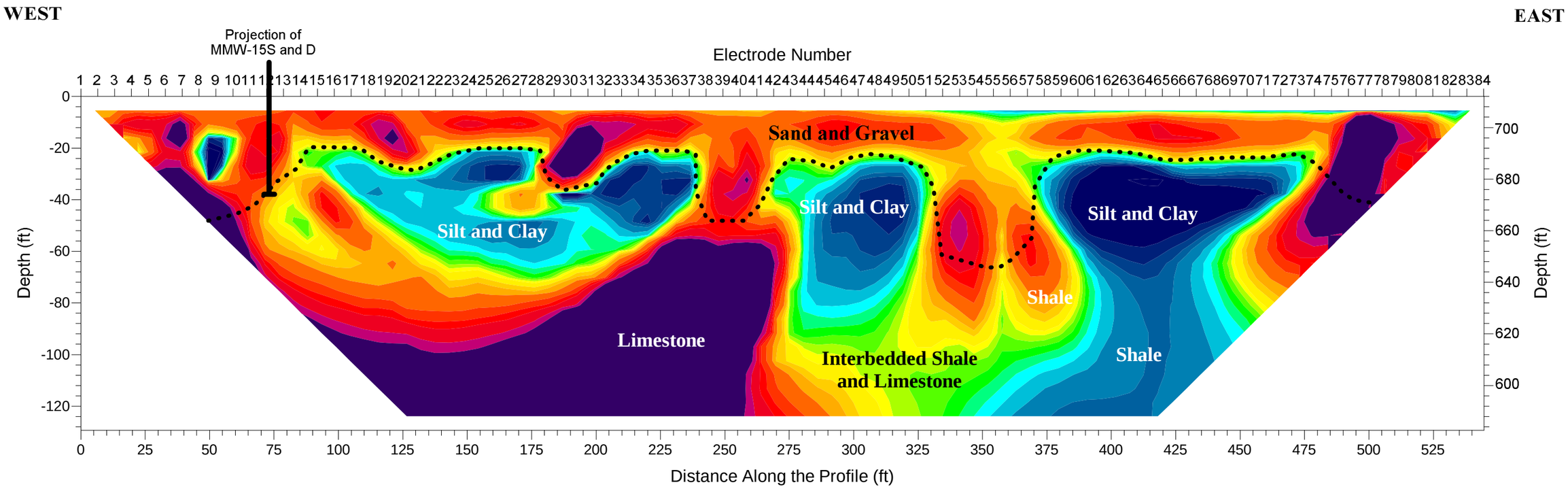

PROCESSING STATISTICS
Number of Iterations: 5
RMS Error: 23.86%
Total Number of Data: 1418
Maximum Misfit: 100%

Resistivity
(Ohm-meters)

Increased Zones of Silt and Clay (Shallow); Shale Bedrock (Deep)

Increased Zones of Sand and Gravel (Shallow); Limestone Bedrock (Deep)

-100 0 5 10 15 20 30 40 50 60 70 80 90 100 125 150 200 300 400 500 750 1000

Interpreted Top of the Till from the Resistivity Data

Projected Location and Depth of Nearby Wells and Borings Along the Profile Line

Resistivity Profile Line 6

Michigan Plaza Apartments
Indianapolis, Indiana
MUNDELL Projectl No. M01046

FIGURE
7

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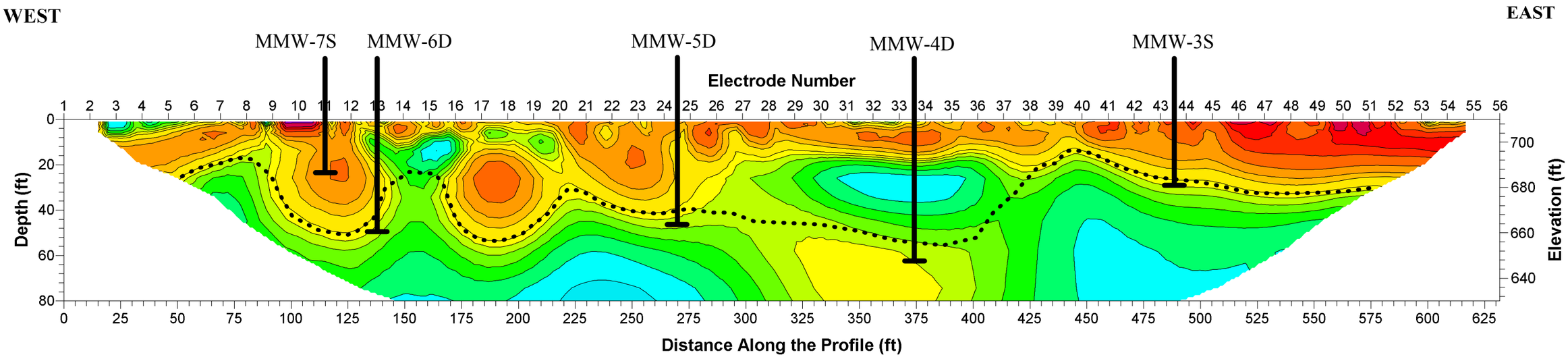
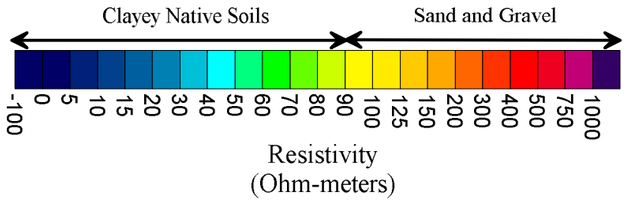
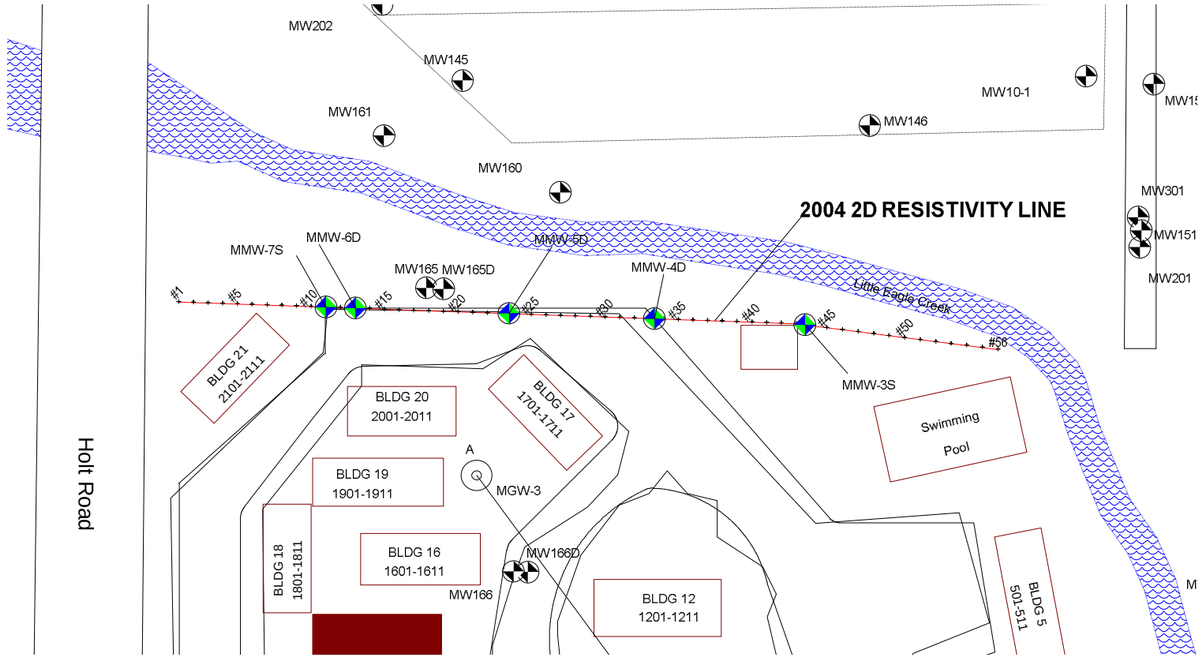




Interpreted Top of the Till from the Resistivity Data

Projected Location and Depth of Nearby Wells and Borings Along the Profile Line

Site Basemap



PROCESSING STATISTICS
Number of Iterations: 5
RMS Error: 8.4%
Total Number of Data: 908
Maximum Misfit: 35%

2004 Resistivity Profile Line
Northern Boundary of Michigan Meadows Apartments
Michigan Street
Indianapolis, Indiana
MUNDELL Projectl No. M01046

FIGURE
8

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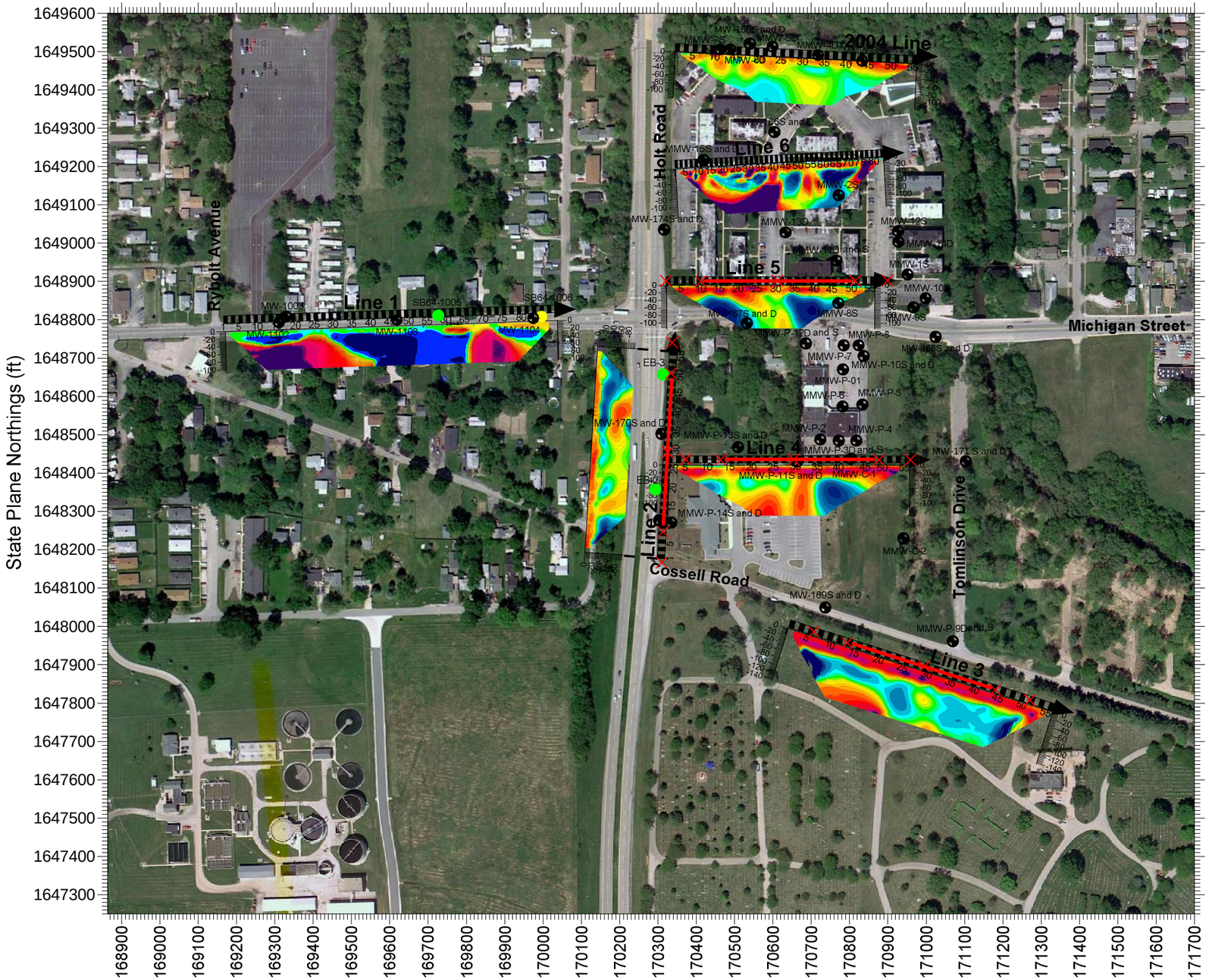

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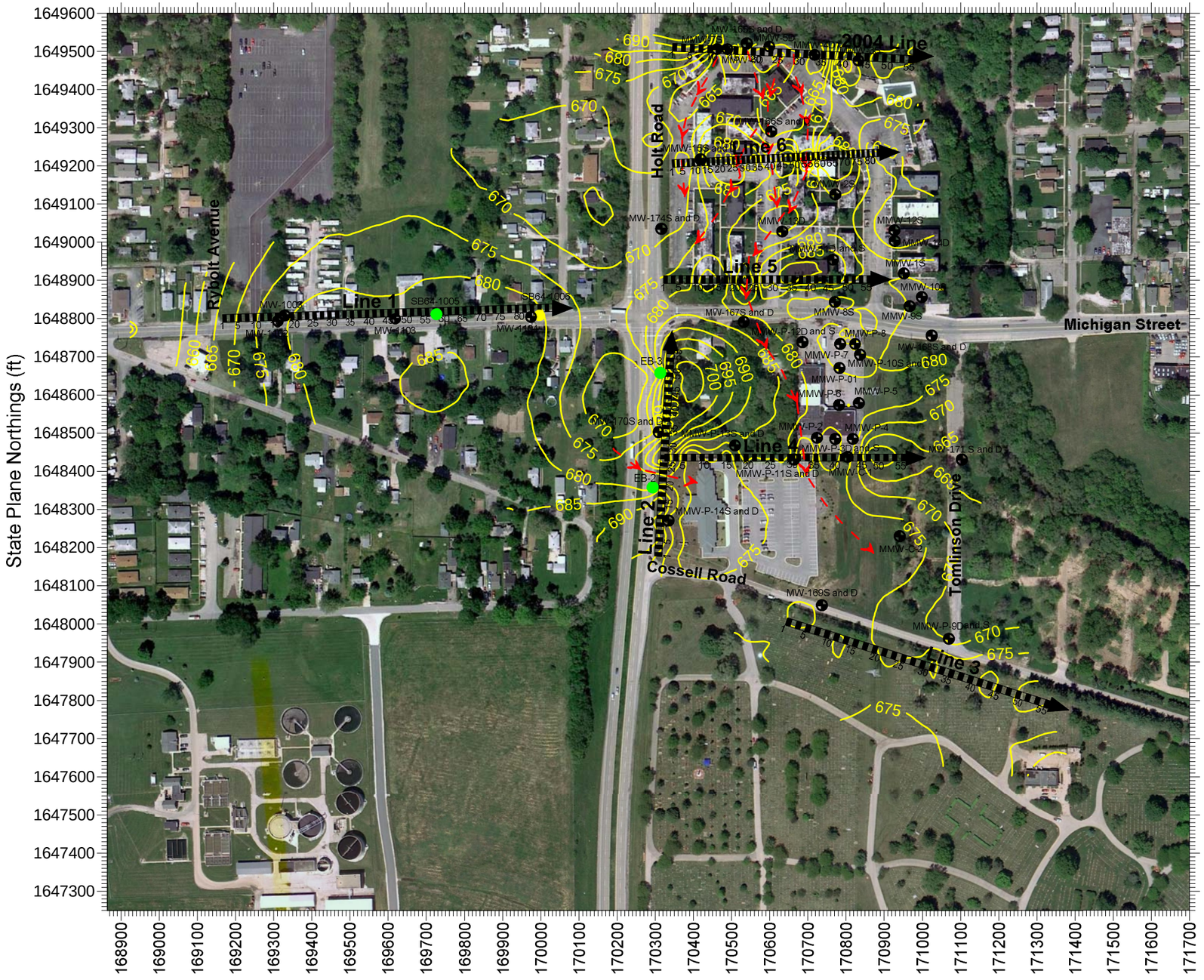
REV.	DATE	DESCRIPTION	BY	APPR.

PROJECT NO.: M01046		FILE NO.: 2011 Resistivity.srf	
DRAWING:		PLOT SIZE:	11"x17"
DRAFTED BY:	GJH	DATE:	12/05/11
CHECKED BY:	GJH	DATE:	12/05/11
APPROVED BY:	JAM	DATE:	12/13/11

Site Map With Resistivity Profiles

Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

FIGURE
9



Resistivity Line Location

Top of Till Elevation (ft. above mean sea level)

Monitoring Well Location

Depression in the Till

N

Scale in Feet

0 100 200 300 400 500

1" = 300'

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REV.	DATE	DESCRIPTION	BY	APPR.

PROJECT NO.: M01046		FILE NO.: 2011 Resistivity.srf	
DRAWING:		PLOT SIZE:	11"x17"
DRAFTED BY:	GJH	DATE:	12/05/11
CHECKED BY:	GJH	DATE:	12/05/11
APPROVED BY:	JAM	DATE:	12/13/11

Top of Till Map from the Geophysical and Boring Data
Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

FIGURE
10A

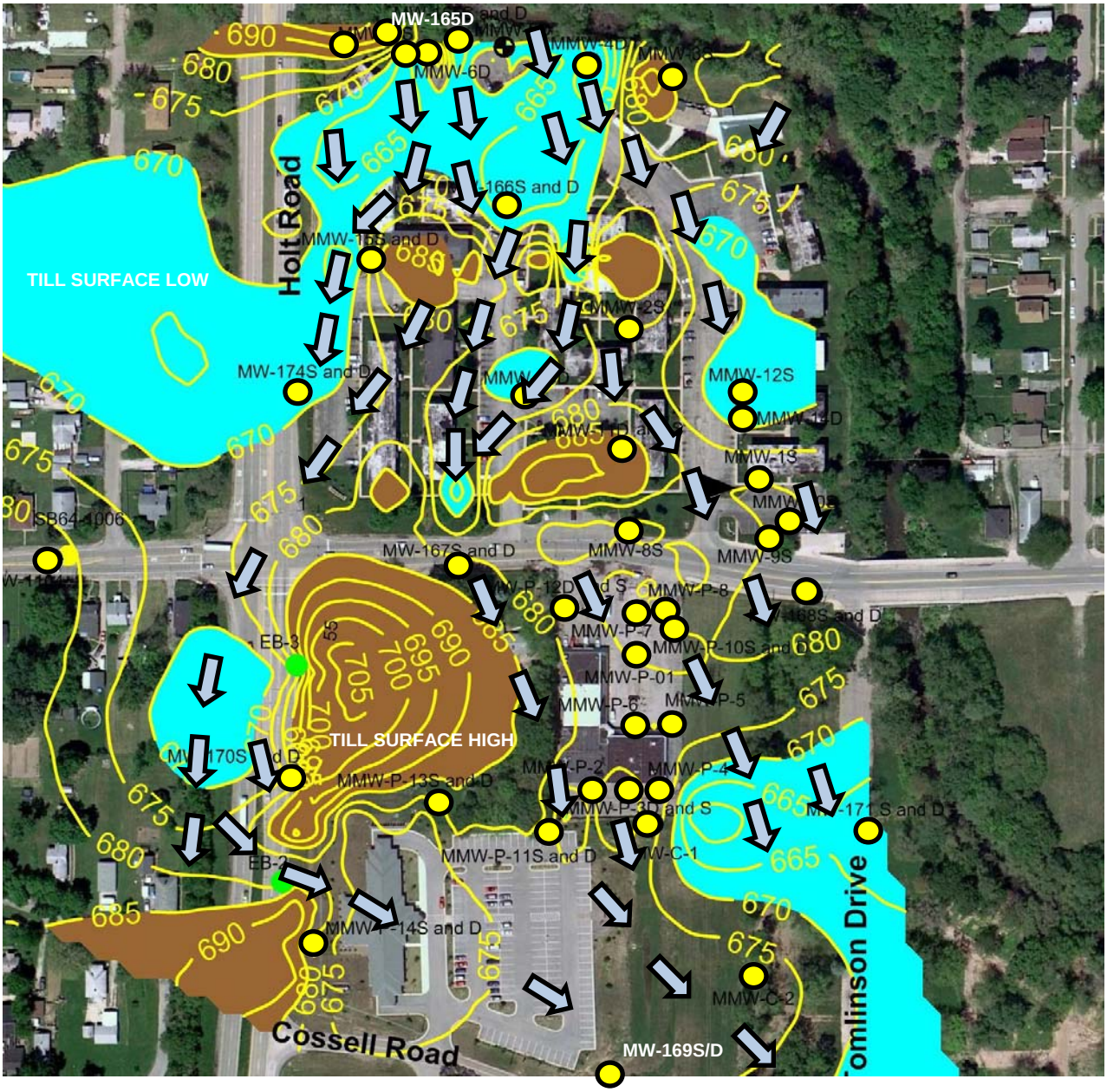
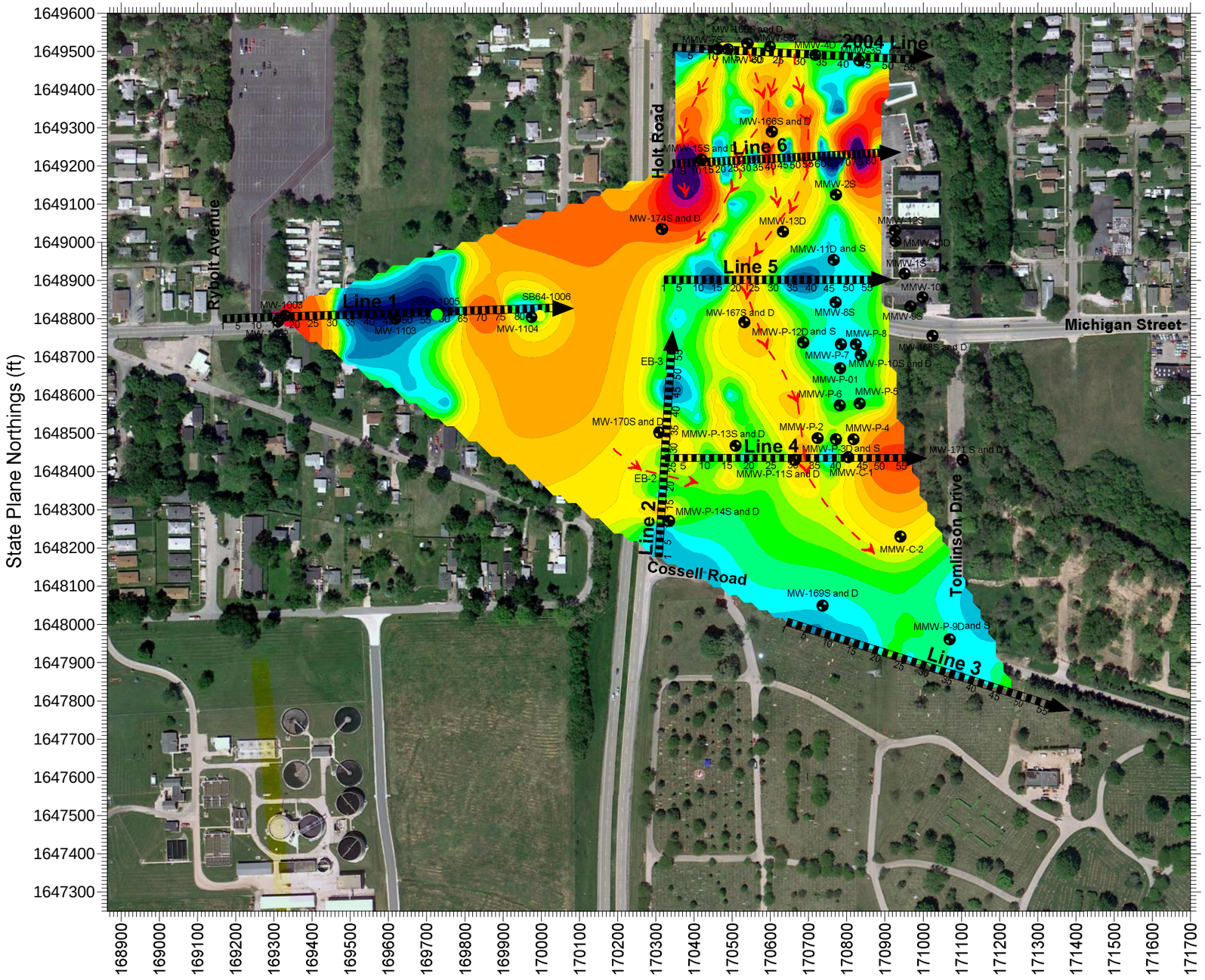


FIGURE 10B.
MICHIGAN PLAZA AND MEADOWS APARTMENTS
CONCEPTUAL SITE FLOW MODEL DEEP UPPER SAND AND GRAVEL



Resistivity Line Location

Monitoring Well Location

Depression in the Till

N

Scale in Feet

0 100 200 300 400 500

1" = 300'

Resistivity (Ohm-meters)

-100 0 5 10 15 20 30 40 50 60 70 80 90 100 125 150 200 300 400 500 750 1000

Increased Zones of Silt and Clay (Shallow); Shale Bedrock (Deep)

Increased Zones of Sand and Gravel (Shallow); Limestone Bedrock (Deep)

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REV.	DATE	DESCRIPTION	BY	APPR.

PROJECT NO.: M01046		FILE NO.: 2011 Resistivity.srf	
DRAWING:		PLOT SIZE:	11"x17"
DRAFTED BY:	GJH	DATE:	12/05/11
CHECKED BY:	GJH	DATE:	12/05/11
APPROVED BY:	JAM	DATE:	12/13/11

Resistivity Slice Map
(670 Ft. Elevation)
Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

FIGURE
11

Table 1. Comparison of Actual and Predicted Top-of-Till Elevations Michigan Street Indianapolis, Indiana Mundell Project No. 01046			
Well ID	Depth to Till from Resistivity Profiles (ft)	Depth to till from Boring Logs (ft)	Depth to Till From Figure 10A
MMW-P-14D	25.1	36.0	35.0
MMW-170D	13.3	37.0	37.0
EB-2	21.2	35.5	36.0
EB-3	30.7	39.6	36.0
MMW-169D	35.9	37.0	36.0
MMW-P-09D	39.3	45.0	45.0
MMW-P-13D	29.7	33.0	34.0
MMW-P-11D	35.4	36.0	38.0
MMW-P-02	52.0	Till Not Encountered	37.0
MMW-P-03D	33.3	Till Not Encountered	34.5
MMW-P-04D	33.5	Till Not Encountered	38.0
EB-1	24.7	34.5	35.0
MW-167D	50.8	34.0	34.0
MMW-P-08S	26.7	Till Not Encountered	26.0
MMW-15D	37.7	39.0	36.0
MW-7S	48.8	Till Not Encountered	46.0
MW-6D	42.0	48.0	38.0
MW-5D	40.5	45.5	42.0
MW-4D	54.1	63.0	54.0
MW-3S	26.4	29.0	26.0
MMW-165D	53.1	47.0	48.0
MW-1102	Not Interpreted	41	40.5
MW-1103	Not Interpreted	36	36.0
MW-1104	Not Interpreted	35	35.0

Table 2. Summary of Monitoring Wells with Downhole Geophysical Logging Michigan Street Indianapolis, Indiana Mundell Project No. 01046			
Well ID	Blank Drilling Interval	Screen Interval	Bottom of Geophysical Log
MMW-08S	0 -40'	14 - 24'	23.15'
MMW-09S	0 -40'	15 - 25'	23.90'
MMW-10S	0 -40'	15 - 25'	24.00'
MMW-11D	20 -32'	23 - 33'	23.20'
MMW-13D	24 - 50'	35 - 50'	47.00'
MMW-14D	24 - 50'	40 - 50'	48.10'
MMW-P-02	12 - 30'	20 -30'	28.90'
MMW-P-03D	30 -40'	25 - 35'	31.30'
MMW-P-07	20 -40'	18 - 28'	25.80'
MMW-P-09D	24 -45'	35 - 45'	43.50'
MMW-P-10S	24 -28'	18 - 28'	24.10'
MMW-P-10D	0 -37.5'	28 - 38'	36.20'
MMW-P-12D	25 -32' and 37 - 40'	31.5 - 37.1'	36.30'

APPENDIX A

BORING LOGS

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-02 MMW-P-02

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: SW Corner of the Plaza
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SL sample:GP-02-7'; 1 GW sample: GP-02-12'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 9.0'
DEPTH OF BORING: 12'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
ASPHALT: About 3 inches of ASPHALT		0.2	4.2				0.0	
GRAVEL: about 6 inches of GRAVEL, GRAVEL BASE COURSE		0.75						
FILL: Fine to medium fill SAND, dark yellowish brown (10 YR 4/4), dry, no odor			5.8					
			5.7	85%				
CL: SILTY CLAY with trace sand and gravel, trace root fragments, very dark gray (10 YR 3/1), slight moist, slightly organic odor		3.0	5.4					
	CL		NA					
			NA				5.0	
- orange coloration observed - maybe Iron, dark brown (10 YR 3/3) with occasional orange-red (2.5 YR 5/8) from about 7.0' to 8.0'			7.5	50%				
			5.1					
SW: FINE TO COARSE SAND with trace to some fine to medium gravel, light yellowish brown (2.5 Y 6/4), wet, no odor		8.0	NA					
	SW		5.3					
- black staining (10 YR 2/1) with possible septic odor observed at about 9.8' - 10.4' , fragments of clay tile at 10.4'			5.2	75%			10.0	
SP: FINE TO MEDIUM SAND with trace coarse sand and fine gravel, light yellowish brown (2.5 Y 6/4), wet, no odor	SP	11.0	6.8					
		12.0						
- End of the Boring at 12'							15.0	

MUNDELL & ASSOCIATES, INC.

MMW-P-03D

BORING LOG

BORING NO: GP-03

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: South of the Plaza (center one)
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SS:GP-03-16'; 3 GW samples:GP-03-20', GP-03-30' & GP-03-40'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 18.0'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
ASPHALT: About 3 inches of ASPHALT		0.2	2.2				0.0	
GRAVEL: about 6 inches of BASE COURSE		0.75						
CL: SILTY CLAY with trace to some medium to coarse and trace to medium gravel, very dark gray (10 YR 3/1), slightly moist, organic odor			1.9					
			2.0	98%				
- color change to dark yellowish brown (10 YR 3/6) at 2'	CL		1.9					
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, dark brown (7.5 YR 4/3), dry, no odor		4.0	NA					
			6.6				5.0	
			6.5	55%				
			6.2					
- color change to light yellowish brown (2.5 Y 6/4) at 6.5' with some gravel observed.	SW		NA					
			8.1					
			8.4	55%			10.0	
			9.5					
SP: FINE TO MEDIUM SAND with trace coarse sand and fine gravel, trace silt, light yellowish brown (2.5 Y 6/4), dry, no odor		11.5	NA					
			8.1					
	SP		8.8	60%			15.0	
			12.9					
			NA					
			8.2					
			8.1	60%				
			11.3					
CL: SILTY CLAY with some medium to coarse sand, light olive brown (2.5 Y 5/6), dry, no odor	CL	19.5					20.0	
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, dark brown (7.5 YR 4/3), dry, no odor		20.0	NA					
			6.6					
			7.4					

MMW-P-03D

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-03

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: South of the Plaza (center one)
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SS:GP-03-16'; 3 GW samples:GP-03-20', GP-03-30' & GP-03-40'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 18.0'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
	SW		12.6	60%			25.0	
			11.8					
			NA					
			NA					
			NA					
			11.6	40%				
			8.3					
BL. DRILLED FROM 30' to 40'		-30.0					30.0	
							35.0	
- End of the Boring at 40'							40.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-07

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: East side of plaza parking lot
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-P-07 (20'), (30'), (40'); SS: 19-20'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
ASPHALT: 3 - 4" of ASPHALT		0.25	0.0				0.0	
FILL: 5 - 6" of FILL gravel, BASE COURSE		1.0	0.0					
SW: FINE TO MEDIUM SAND, yellowish brown (10 YR 4/4), dry, no odor	SW		0.0	100%				
CL: SILTY CLAY with trace to some sand, trace fine gravel and coarse sand, very dark gray (10 YR 3/1), dry, no odor	CL	3.0	0.0					
			0.0				5.0	
			0.0	75%				
SW: FINE TO COARSE SAND with trace to some fine to medium gravel, dark yellowish brown (10 YR 4/4), dry, no odor	SW	6.0	0.0					
		7.0	0.0					
SP: FINE TO MEDIUM SAND with trace silt, light olive brown (2.5 Y 5/4), dry, no odor	SP		0.0					
			0.0					
			0.0	60%			10.0	
			0.0					
			0.0					
			0.0	60%				
SW: MEDIUM TO COARSE SAND with trace gravel, dry, no odor	SW	14.0	0.0					
			0.0				15.0	
			0.0					
			0.0					
			0.0	75%				
			0.0					
		20.0					20.0	
- blind drilled below 20 feet								
							25.0	
- Well set at 28'								
							30.0	
							35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-07

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: East side of plaza parking lot
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-P-07 (20'), (30'), (40'); SS: 19-20'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✱		40.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-9D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: NW corner of intersection of Olin Ave. and Cossell Rd.
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 5/31/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 45'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
TOPSOIL: with Grass and roots, very dk grayish-brown (10 YR 3/2)			0.1	55%			0.0	
			3.1					
CL: SILTY CLAY with trace gravel, dry, dark brown (10 YR 3/3)	CL	3.0	NR	40%			5.0	
			2.5					
SW: FINE TO MEDIUM SAND with trace gravel, slightly moist, brown (10 YR 4/3)	SW	7.0	2.7	75%			10.0	
			5.5					
SW: COURSE SAND with gravel, slightly moist, brown (10 YR 4/3)	SW	11.0	0.1	60%			15.0	
			0.1					
SW: FINE TO MEDIUM SAND with trace silt and gravel, slightly moist, brown (10 YR 4/3)	SW	15.0	NR	50%				
- 1" very wet sand, almost greasy @ 15'								
SW: COURSE SAND with trace silt and gravel, slightly moist, no odor	SW	18.0	0.1				20.0	▼
- 3" orange color (7.5 YR 4/6) @ 18.25'								
SW: VERY COARSE SAND with gravel, wet, brown (10 YR 4/3)	SW	20.0	0.1	60%				

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-9D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: NW corner of intersection of Olin Ave. and Cossell Rd.
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 5/31/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 45'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
SW: MEDIUM TO COARSE SAND, with gravel, wet, dark gray (10 YR 4/1)	SW	23.0	0.1					
		24.0						
- Blind drilled							25.0	
							30.0	
							35.0	
							40.0	
End of boring @ 45'		45.0					45.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-9D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: NW corner of intersection of Olin Ave. and Cossell Rd.
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 5/31/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 45'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-10S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: E side of plaza parking lot, S of MMW-P-08
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 18.5'
DEPTH OF BORING: 28'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
ASPHALT: 3 - 4" of ASPHALT		0.25					0.0	
FILL: 6 - 8" of FILL gravel, BASE COURSE			0.1					
SW: FINE TO MEDIUM SAND with gravel, dry, pale brown (10 YR 6/3)	SW	1.0						
CL: SILTY CLAY with gravel, dry, black (10 YR 2/1)	CL	2.0	0.1	75%				
CL: SANDY CLAY with gravel, slightly moist, dk brown (10 YR 3/3)	CL	3.0						
CL: SILTY CLAY with gravel, slightly moist, dk brown (10 YR 3/3)	CL	3.5	NR				5.0	
SW: MEDIUM TO COARSE SAND with gravel, slightly moist, brown (10 YR 4/3)	SW	6.0	0.1	65%				
			NR					
			0.1	65%			10.0	
			NR					
			0.1	45%			15.0	
			NR			SS 16-17'		
SW: MEDIUM TO COARSE SAND with gravel, wet, brown (10 YR 4/3)	SW	18.5	15.0	50%				▼
SW: MEDIUM TO COARSE SAND with gravel, wet, grayish-brown (10 YR 5/2)	SW	20.0	0.1	100%			20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-10S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: E side of plaza parking lot, S of MMW-P-08
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 18.5'
DEPTH OF BORING: 28'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
SP: FINE TO MEDIUM SAND, wet, grayish-brown (10 YR 5/2)	SP	23.0	0.1					
- Blind drilled		24.0					25.0	
End of boring @ 28'		28.0					30.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-10D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: E side of plaza parking lot, S of MMW-P-08
FIELD GEOLOGIST: April Nelson & Leena Lothe
NOTES:

DATE BEGAN: 6/1/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 18.5'
DEPTH OF BORING: 37.5'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- Blind drilled							0.0	
							5.0	
							10.0	
							15.0	
							20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-10D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: E side of plaza parking lot, S of MMW-P-08
FIELD GEOLOGIST: April Nelson & Leena Lothe
NOTES:

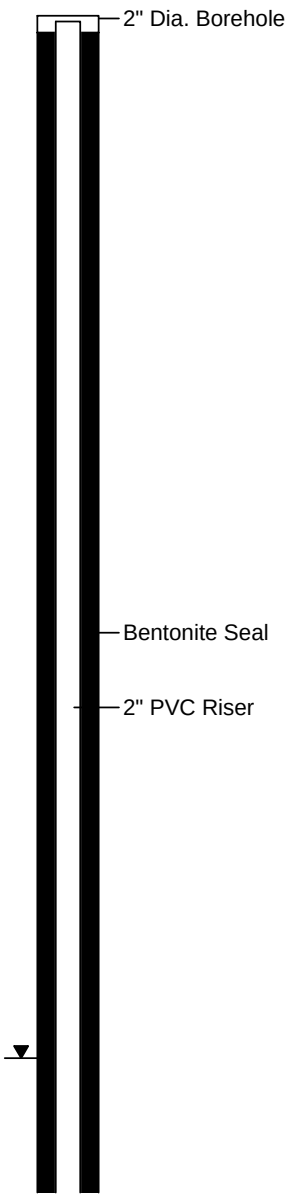
DATE BEGAN: 6/1/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 18.5'
DEPTH OF BORING: 37.5'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
End of boring @ 37.5'							25.0 30.0 35.0 40.0	

Boring/Well ID: MMW-P-12D

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 9/1/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 9/1/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: NW of Michigan Plaza	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0		Asphalt/Topsoil	0.5				
1	SM	SILTY SAND with trace gravel, dark brown (7.5YR 3/2), dense, dry		3.6	75		
2				2.7			
3		No Recovery 3 to 4 ft		-			
4							
5	SW	SAND with some gravel, Well Graded, brown (10YR 5/3), loose, dry	5.0	7.0	75		
6				3.7			
7		No Recovery 7 to 8 ft		-			
8				3.8	63		
9							
10		Yellowish red (5YR 5/8) oxidation 10 to 10.5 ft		4.8			
11		No Recovery 10.5 to 12 ft		-			
12							
13				7.9			
14	ML	SILT with trace sand, brown (10YR 5/3), loose, moist	14.0		75		
15	SM	Fine SILTY SAND, brown (10YR 5/3) with yellowish red (5YR 5/8) oxidation, loose, moist	14.5	11.0			
16		No Recovery 15 to 16 ft	16.0	-			
17	SW	Fine to medium SAND with trace gravel, brown (10YR 5/3), dense		13.8	75	*	Soil Sample SBP12D:160180
18		Yellowish red (5YR 5/8) oxidation at 17.5 ft					
19	SW-GW	SAND and GRAVEL, Well Graded, gray (2.5Y 5/1), dense, wet	18.5	12.1			
20		No Recovery 19 to 20 ft	20.0	-			
21	SW	Fine to medium SAND with trace gravel, brownish gray (10YR 6/2), dense, wet		2.9	75		



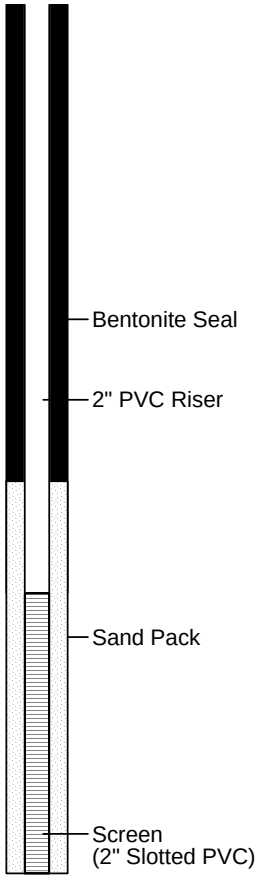
REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-P-12D

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 9/1/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 9/1/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: NW of Michigan Plaza	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
21	CL	SILTY CLAY, brownish gray (10YR 6/2), hard, plastic, wet	21.0	2.9			
21.5			21.5				
22		SAND and GRAVEL, Well Graded, brownish gray (10YR 6/2), wet		1.3	75		
23		Coarse SAND and GRAVEL, gray (2.5Y 5/1) 22.5 to 23 ft		-			
24		No Recovery 23 to 24 ft		2.4			
25							
26					25	*	Water Sample SBP12D:260
27							
28							
29	SW-GW	No Recovery 25 to 32 ft		-			
30					0		
31							
32							
33				3.5			
34					100		
35				9.3			
36	SW	Fine SAND, brown (10YR 5/3), dense, wet	36.0			*	Water Sample SBP12D:360
36.5			36.5	6.5		*	Soil Sample SBP12D:360370
37		SILTY CLAY, gray (2.5Y 5/1), hard, dry					
38	CL				25		
39		No Recovery 37 to 40 ft		-			
40			40.0				
41		End of boring at 40 ft					
42							

MMW-P-12D



REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-8S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 6
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-8S (20'), (30'), (40'); SS: 14-15'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- blind drilled							0.0	
							5.0	
							10.0	
					✱		15.0	▼
					✱		20.0	
- Well set at 24'							25.0	
					✱		30.0	
							35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-8S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 6
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-8S (20'), (30'), (40'); SS: 14-15'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✱		40.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-9S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 1
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-9S (20'), (30'), (40'); SS: 15-16'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- blind drilled							0.0	
							5.0	
							10.0	
							15.0	
							20.0	
- Well set at 25'							25.0	
							30.0	
							35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-9S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 1
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-9S (20'), (30'), (40'); SS: 15-16'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✱		40.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-10S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 1
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-10S (20'), (30'), (40'); SS: 14-16'

DATE BEGAN: 1/12/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- blind drilled							0.0	
							5.0	
							10.0	
					✱		15.0	▼
					✱		20.0	
- Well set at 25'							25.0	
					✱		30.0	
							35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-10S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 1
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-10S (20'), (30'), (40'); SS: 14-16'

DATE BEGAN: 1/12/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information		
- End of Boring at 40'					✱		40.0			

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-11D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: N of Bldg 10, W of Bldg 6
FIELD GEOLOGIST: April Nelson & Leena Lothe
NOTES:

DATE BEGAN: 6/1/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 36'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
ASPHALT: 3 - 4" of ASPHALT		0.25					0.0	
FILL: 6 - 8" of FILL gravel, BASE COURSE								
CL: SILTY CLAY with gravel, dry, very dk brown (10 YR 2/2)	CL	1.0		10%				
							5.0	
CL: SILTY CLAY with trace gravel, slightly moist, dk brown (10 YR 3/3)	CL	6.0		80%				
	CL	6.5						
CL: SANDY CLAY with trace gravel, slightly moist, dk grayish brown (10 YR 4/2)		7.0						
CL: SANDY CLAY with trace gravel, slightly moist, brown (10 YR 4/3)	CL							
SC: CLAYEY SAND with trace gravel, slightly moist, brown (10 YR 4/3)	SC	9.5		75%			10.0	
SW: MEDIUM SAND with trace gravel, slightly moist, brown (10 YR 5/3)	SW	11.0						
SW: MEDIUM TO COARSE SAND with gravel, slightly moist, brown (10 YR 4/3)	SW	13.0		65%			15.0	▼
SW: MEDIUM TO COARSE SAND with gravel, wet, brown (10 YR 4/3)	SW	16.0		65%				
- Blind drilled		20.0					20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-11D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: N of Bldg 10, W of Bldg 6
FIELD GEOLOGIST: April Nelson & Leena Lothe
NOTES:

DATE BEGAN: 6/1/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 36'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
CL: SILTY CLAY, very hard and dense, dk gray (10 YR 4/1)	CL	32.0					25.0 30.0 35.0	
End of boring @ 36'		36.0						

MUNDELL & ASSOCIATES

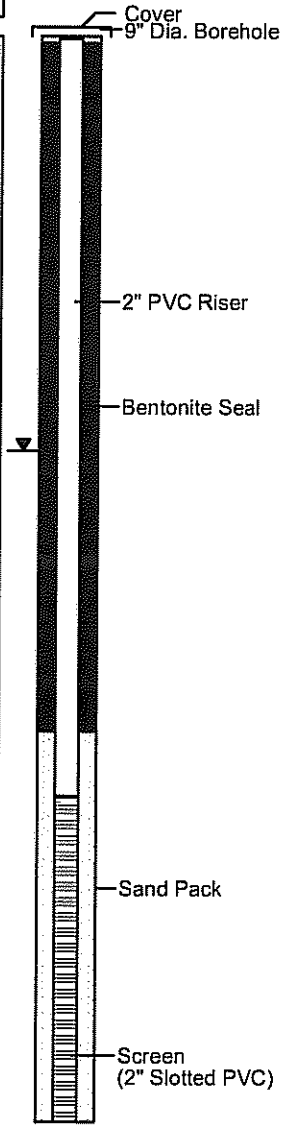
caring for the earth and all it holds

Boring/Well ID: MW-13D

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 11/21/08
PROJECT NAME: Michigan Meadows	DATE FINISHED: 11/26/08
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe/Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT:
DRILLER: JR	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0	GR		Grass, topsoil	0.10	NA			
	CL		Dark olive brown, 2.5 Y 3/3, dry, SILTY CLAY, no odor		0.2	60		
					0.2			
					0.6			
5			Dark olive brown 2.5 Y 3/3, dry, SAND, poorly graded, fine grained, with gravel matrix, no odor	5.0	NA			
					0.2	75		
	SP				0.3			
					1.0			
10					NA			
					NA	NR		
					NA			
					NA			
	CL			12.0	NA			
				14.0	1.2	75		
15			No Recovery from 8-12 ft-bgs		0.8			
	SW		Dark Gray (10 YR 4/1), dry, SILTY CLAY, with gravel matrix, no odor, CLAY layer at 16 ft-bgs		0.7			
					0.4			
					0.2			
20			Dark gray (10YR 4/1), dry, SAND, well graded, no odor		0.2			
	SW			20.0				
			Wet at 17 to 18 ft bgs					
			Water at 19 to 20 ft-bgs	24.0				
25			2.5 Y 7/2. wet, SAND, well graded, fine to medium grainded, with gravel matric, no odor					
			Blank drilled from 24 ft-bgs					
30								
35								
40								
45								
50			Bottom of Boring at 50 ft-bgs					

MW-14D



TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

06-22-200? r:\2001\M01046 Michigan Meadows Apts\Boring Logs\Nov 08-Feb 09\M01046 MW-13D.bor

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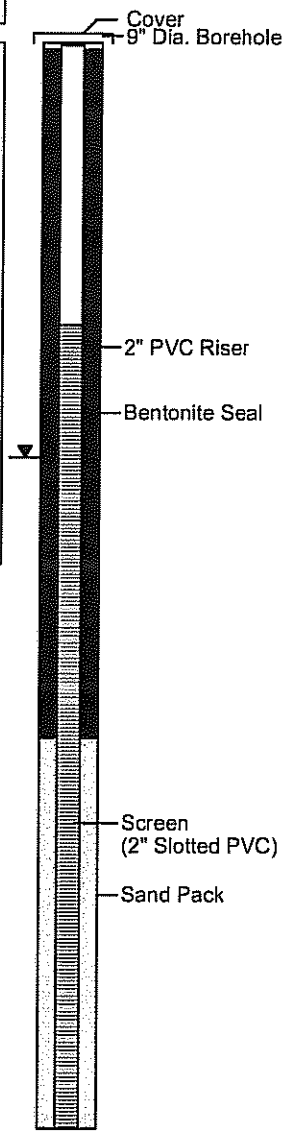
caring for the earth and all it holds

Boring/Well ID: MW-14D

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 12/10/08
PROJECT NAME: Michigan Meadows	DATE FINISHED: 11/26/08
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe/Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: 5410 & HSA
DRILLER: Midway	GW DEPTH (OBSERVED):
BORING LOCATION: West of Bldg 2	SURFACE ELEVATION:

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0	GR							
	CL		Grass, topsoil	0.16	0.2			
			Dark brown, slightly moist, SILTY CLAY, with trace sand, no odor, grass roots observed	2.0	0.2	60		
					0.6			
5	CL		Dark brown (10YR 3/3), dry, SILTY CLAY, fine to medium grained sand, , no odor		0.6			
					NA			
					2.2	75		
					0.8			
			Light gray (2.5 Y 7/2), dry, SAND, well graded, fine to medium grained, with gravel matrix, no odor	7.5	0.8			
					2.4			
10	SW		Cobble layer at 8 ft-bgs		2.1	70		
					0.8			
					0.8			
					NA			
			Cobble layer at 15 to 16 ft-bgs		0.7	75		
15				15.0	0.2			
				16.0	0.4			
	SW		Wet at 16 ft-bgs		1.0			
	CL			17.0	NA	60		
			Clay seam at 17 ft-bgs with trace sand	17.50	2.4			
20	SW		, SAND, well graded		2.8			
					NA			
					3.2	50		
				24.0	3.3			
25			Blank drilled from 24 ft-bgs					
30								
35								
40								
45								
50			Bottom of the boring at 50 ft-bgs					

MW-14D



TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

APPENDIX B

GEOPHYSICAL WELL LOGS

110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-08S
LOC 60'S of Apt. Building 10
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY	Mundell and Associates		
WELL ID	MMW-08S		
CITY	Indianapolis		
STATE	Indiana	COUNTRY	U.S.A.

LOCATION
Approximately 10' N of Michigan St. and 60' S of Michigan Meadows Apartment Building 10.

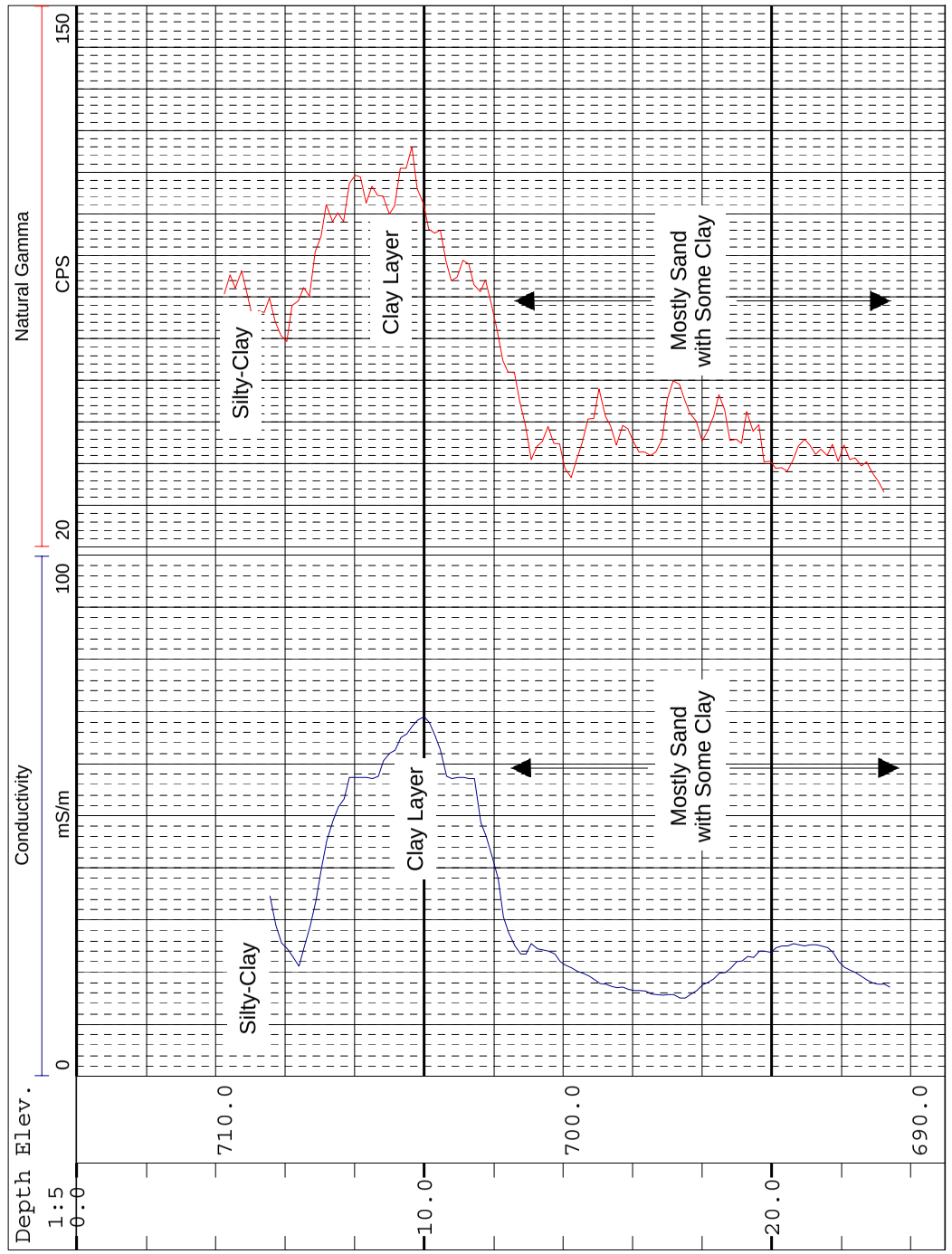
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A		ELEVATION	714.24'	K.B. N/A
LOG MEAS. FROM	TOC		ABOVE PERM. DATUM		D.F. N/A
DRILLING MEAS. FROM	Ground Surface				G.L. N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	23.15' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-09S
LOC Aprox. 80' S of Bld. 1, in grass
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY Mundell and Associates
WELL ID MMW-09S
CITY Indianapolis
STATE Indiana COUNTRY U.S.A.

LOCATION
Approximately 25' N of Michigan St. and 80' S of Michigan Meadows Apartment Building 1, in the grass.

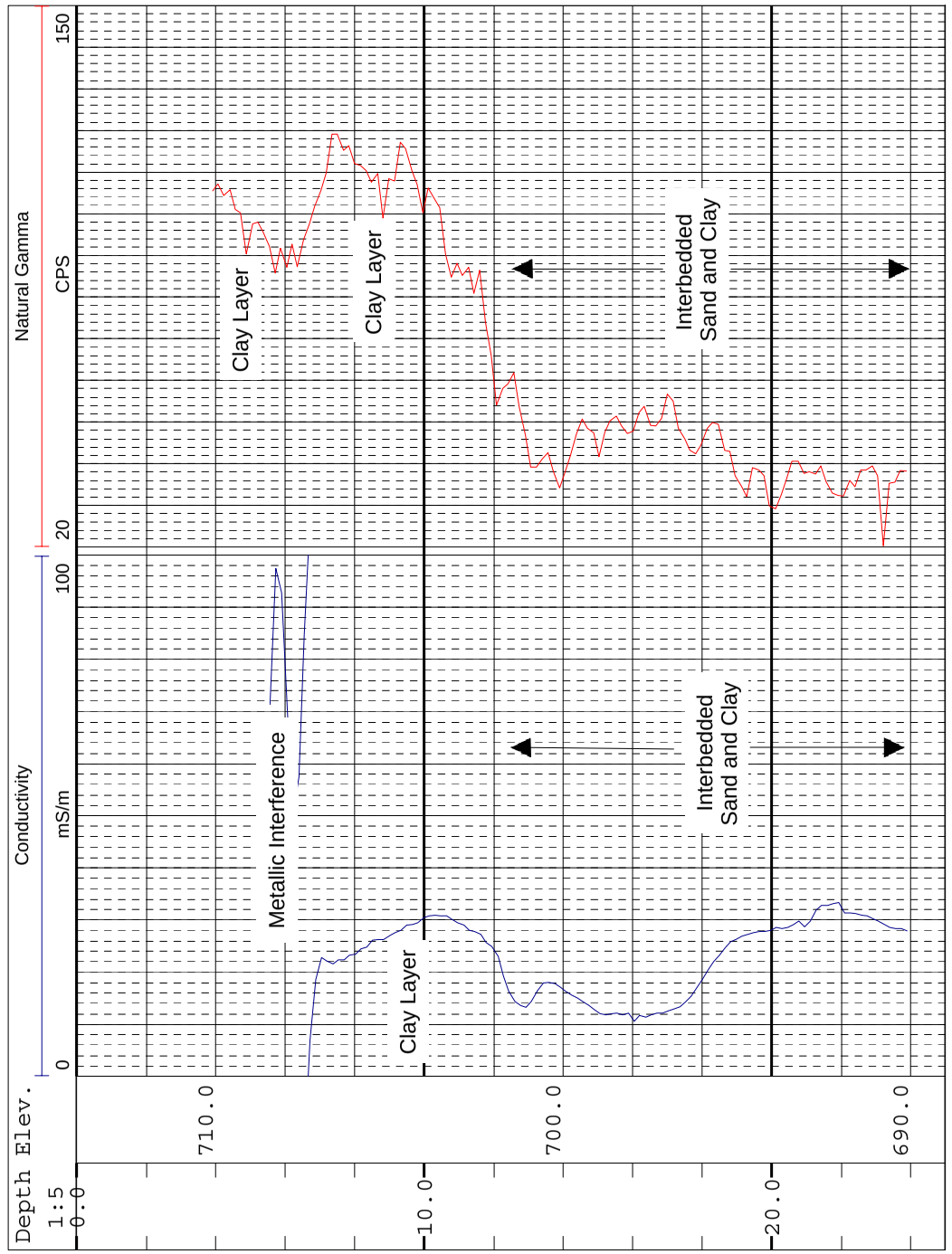
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A	ELEVATION 713.71'	K.B. N/A
LOG MEAS. FROM	TOC	ABOVE PERM. DATUM	D.F. N/A
DRILLING MEAS. FROM	Ground Surface		G.L. N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	23.90' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-10S
LOC 60'S of Apt. Building 1
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY Mundell and Associates
WELL ID MMW-10S
CITY Indianapolis
STATE Indiana COUNTRY U.S.A.

LOCATION
Approximately 60' N of Michigan St. and 60' S of Michigan Meadows Apartment Building 1, in the parking lot.

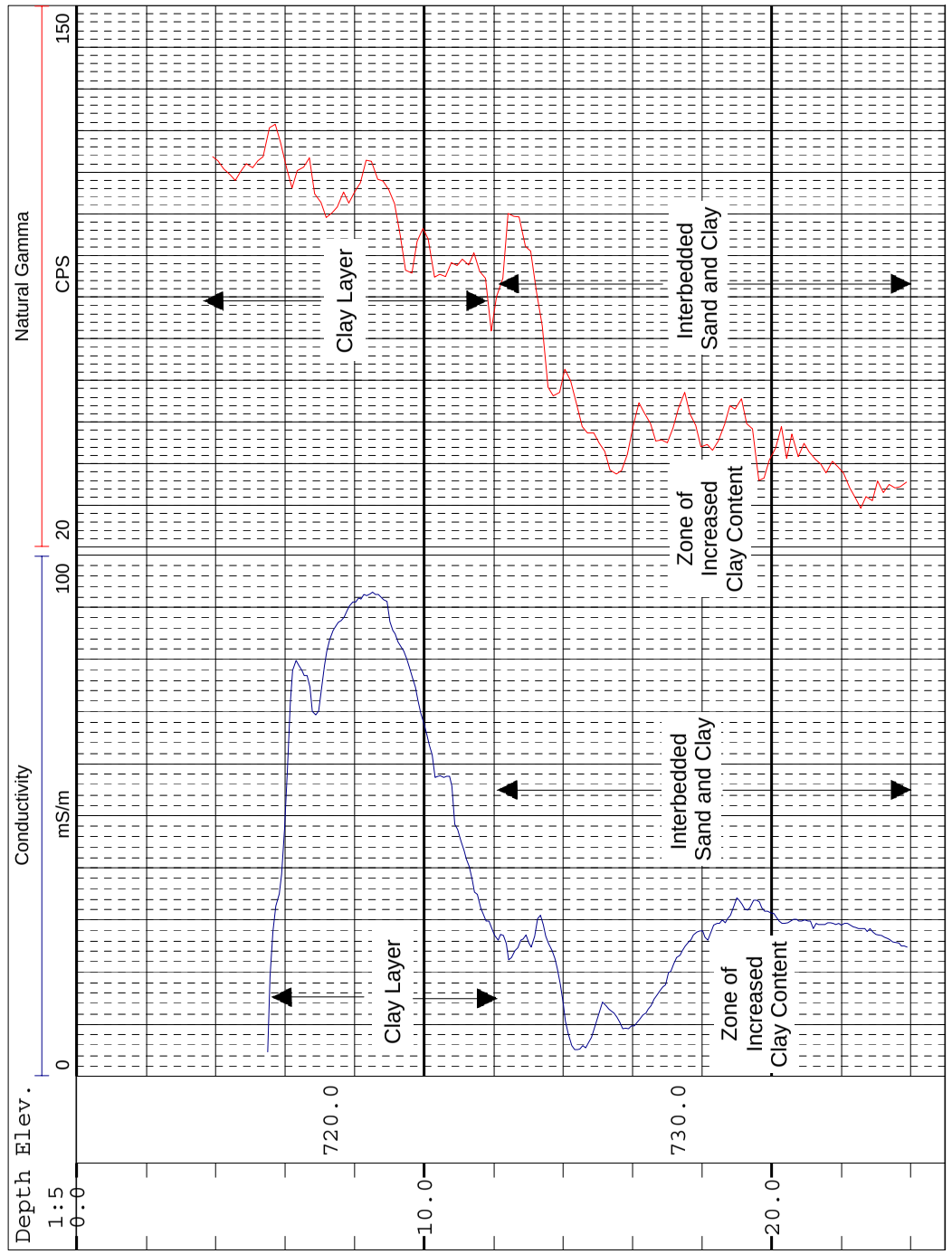
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A	ELEVATION 712.69'	K.B. N/A
LOG MEAS. FROM	TOC	ABOVE PERM. DATUM	D.F. N/A
DRILLING MEAS. FROM	Ground Surface		G.L. N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	24.0' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



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PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-11D
LOC 7' E of Apt. Building 10
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY Mundell and Associates
WELL ID MMW-11D
CITY Indianapolis
STATE Indiana COUNTRY U.S.A.

LOCATION
The western well, In between Apartment Buildings 10 and 6.

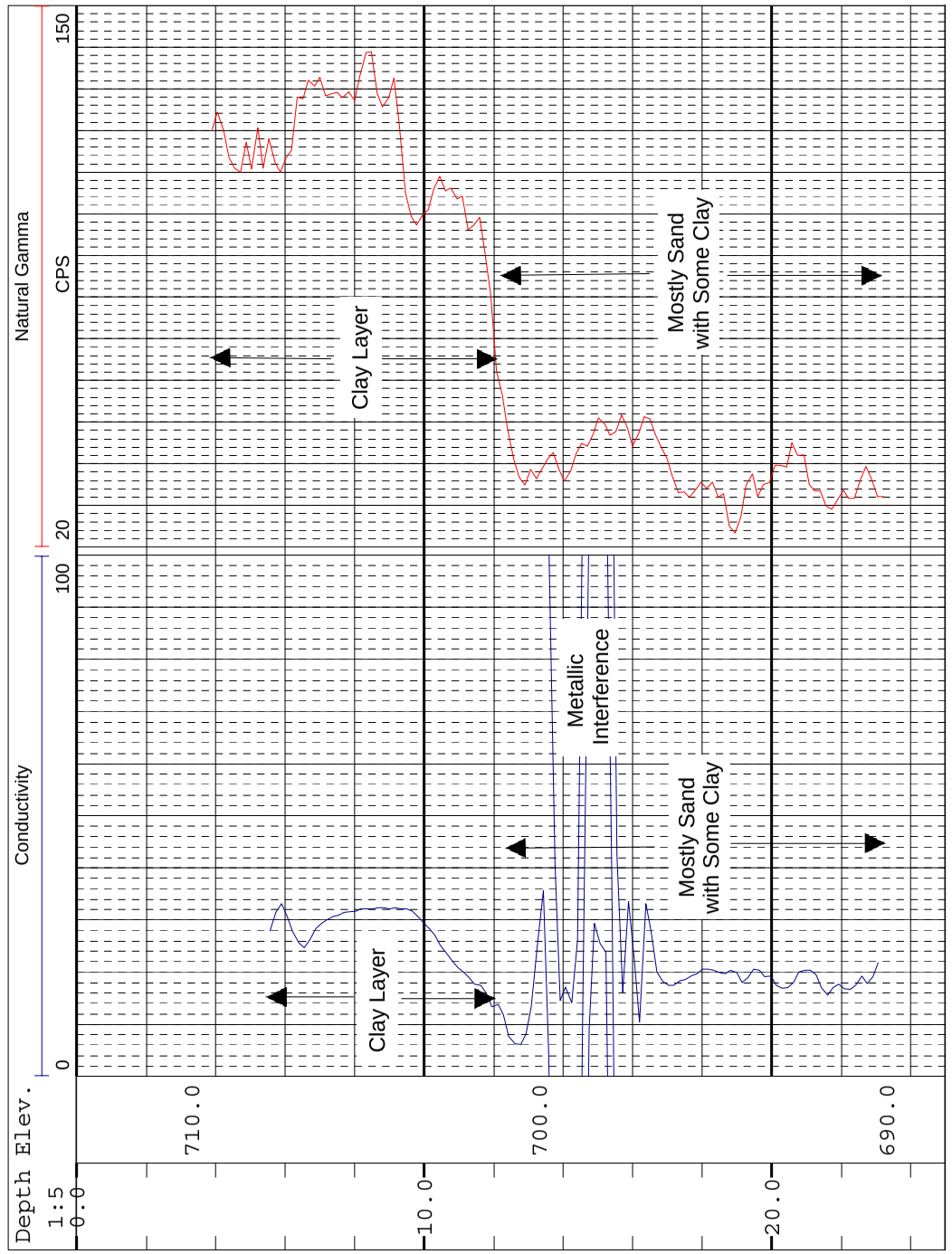
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A	ELEVATION	713.33'	K.B.	N/A
LOG MEAS. FROM	TOC	ABOVE PERM. DATUM		D.F.	N/A
DRILLING MEAS. FROM	Ground Surface			G.L.	N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	23.2' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



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PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-13D
LOC 45'W of Apt. Building 9
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY	Mundell and Associates
WELL ID	MMW-13D
CITY	Indianapolis
STATE	Indiana
COUNTRY	U.S.A.

LOCATION
Approximately 200' N of Michigan St. and 45' W of Michigan Meadows Apartment Building 9, in the grass.

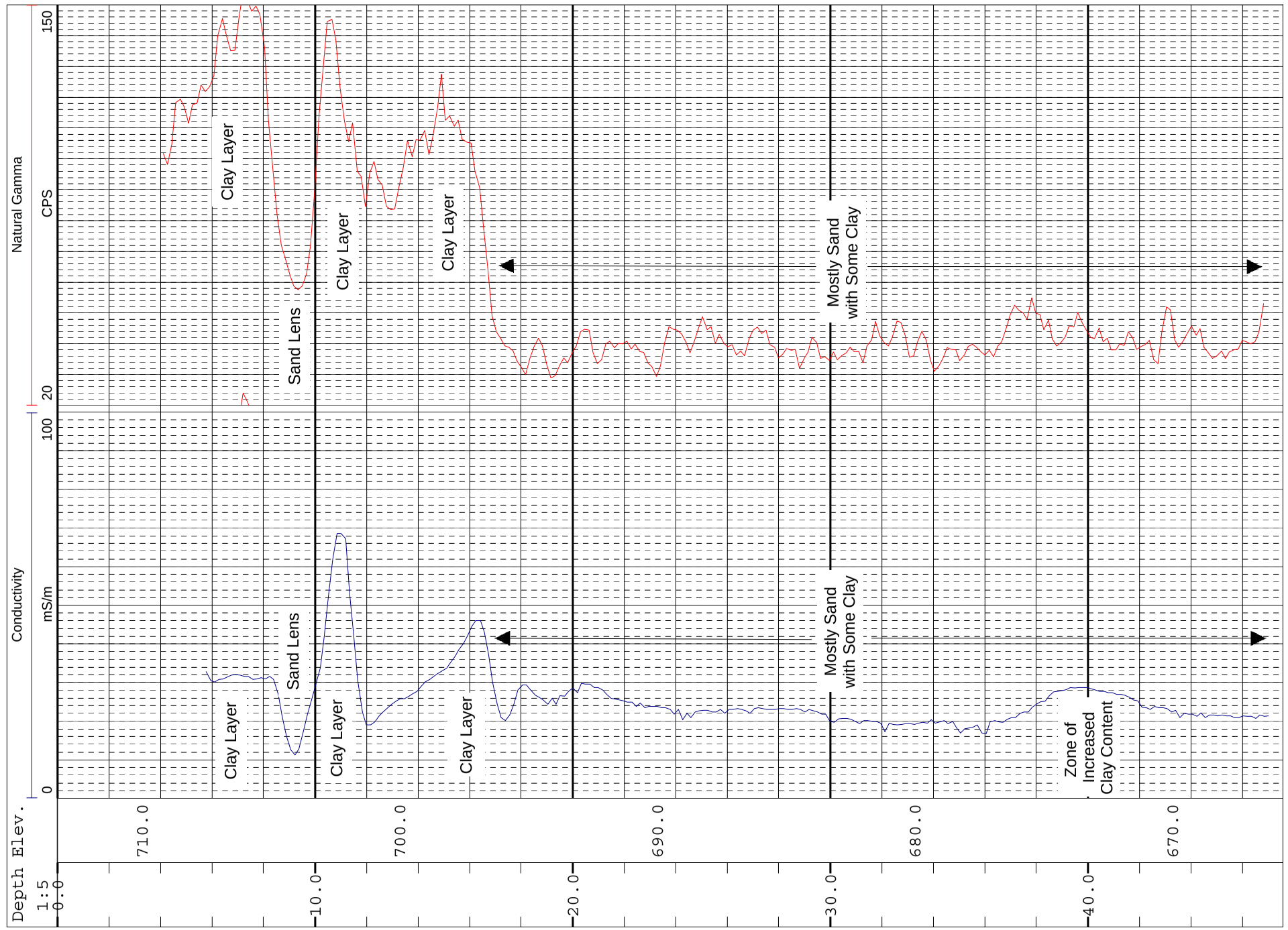
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A	ELEVATION 713.28'	K.B. N/A
LOG MEAS. FROM	TOC	ABOVE PERM. DATUM	D.F. N/A
DRILLING MEAS. FROM	Ground Surface		G.L. N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	47.0' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



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PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-14D
LOC 20'W of Apt. Building 2
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY Mundell and Associates
WELL ID MMW-14D
CITY Indianapolis
STATE Indiana COUNTRY U.S.A.

LOCATION
Approximately 200' N of Michigan St. and 20' W of Michigan Meadows Apartment Building 2, in the grass.

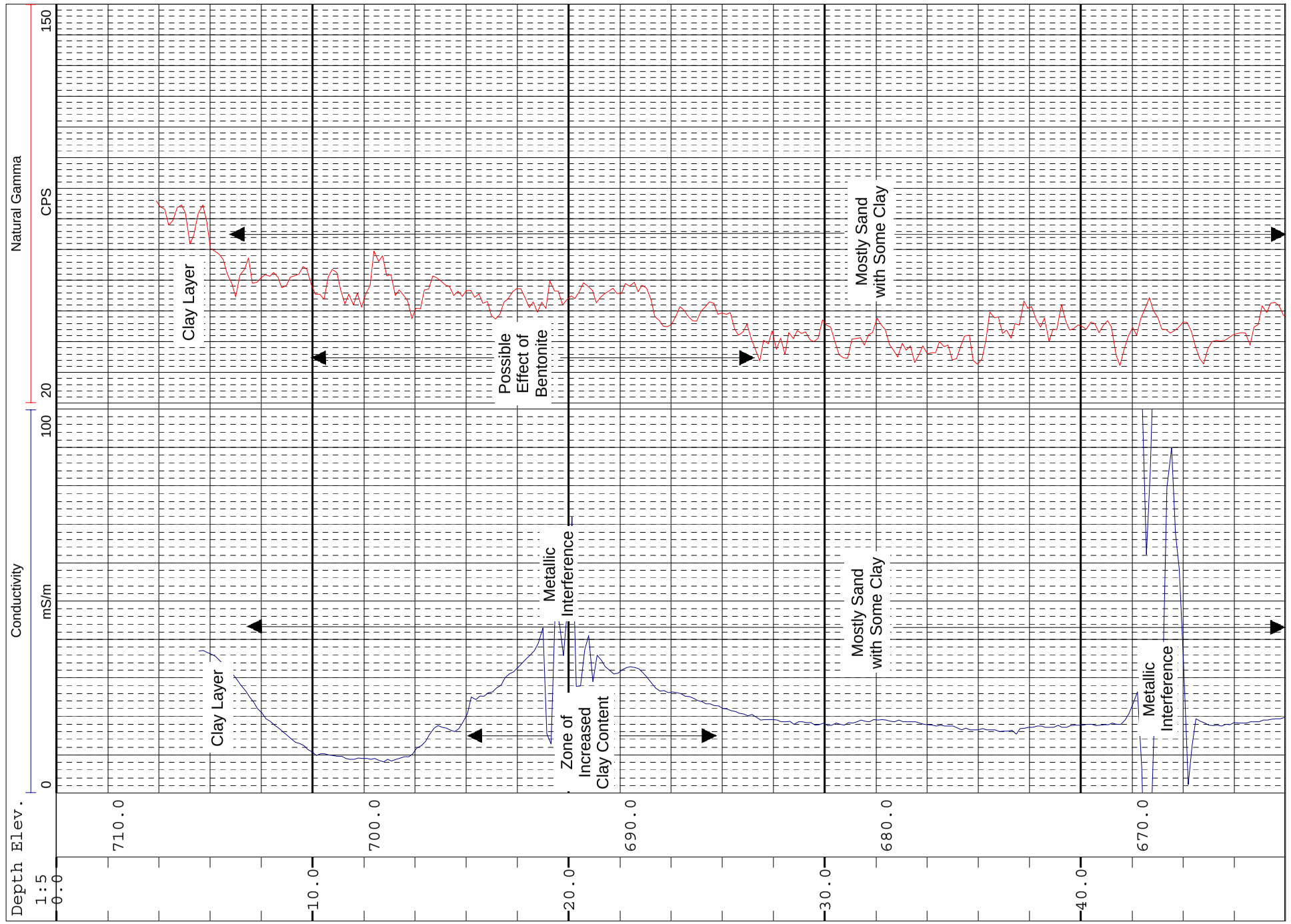
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A		ELEVATION	712.41'	K.B. N/A
LOG MEAS. FROM	TOC		ABOVE PERM. DATUM		D.F. N/A
DRILLING MEAS. FROM	Ground Surface				G.L. N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	48.1' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



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PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-P-02
LOC Alley Behind Michigan Plaza
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY	Mundell and Associates
WELL ID	MMW-P-02
CITY	Indianapolis
STATE	Indiana
COUNTRY	U.S.A.

LOCATION
In the alley behind Michgian Plaza, approximately 7' S of the Tire Shop.

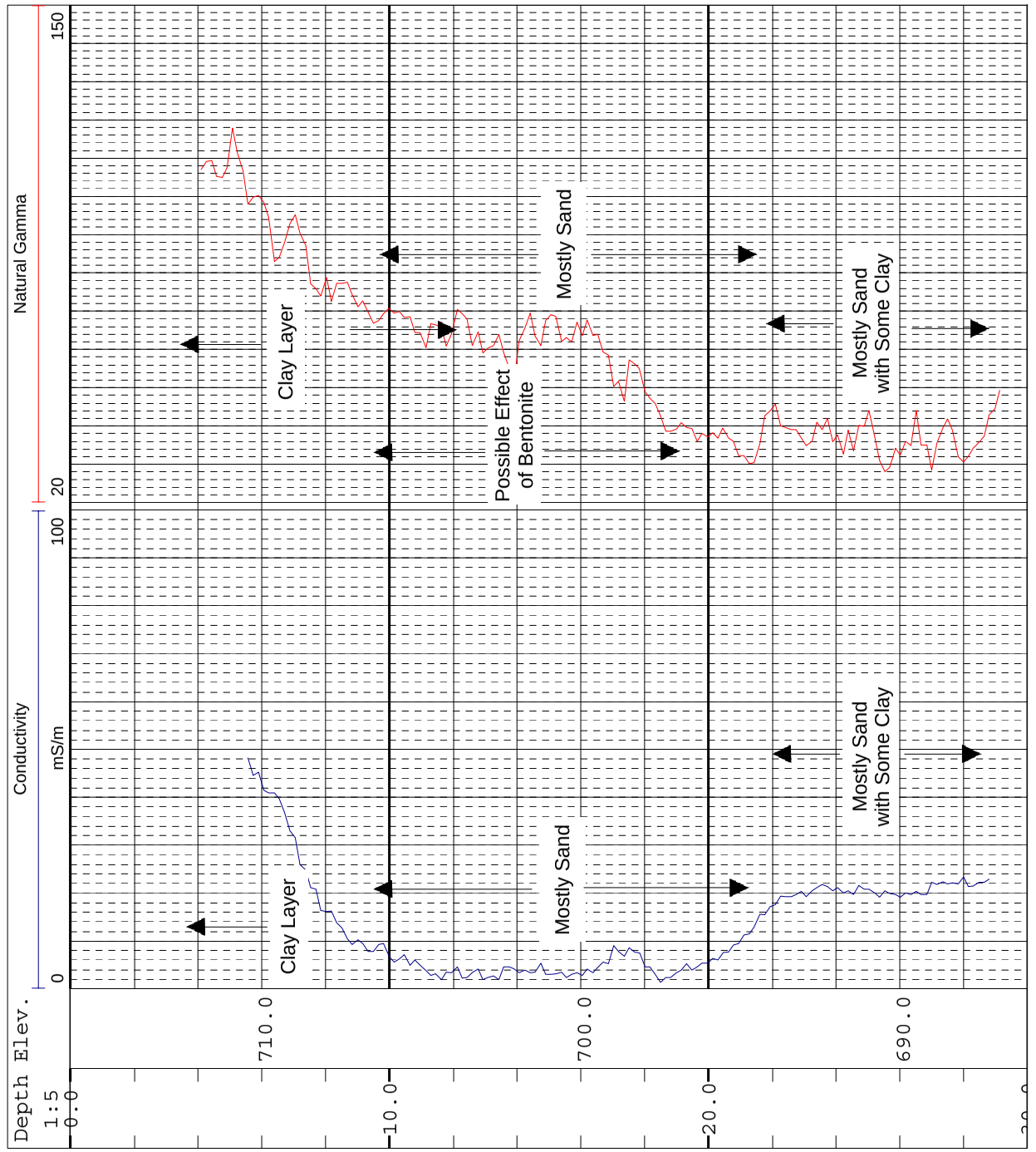
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A		ELEVATION	716.09'	K.B. N/A
LOG MEAS. FROM	TOC		ABOVE PERM. DATUM		D.F. N/A
DRILLING MEAS. FROM	Ground Surface				G.L. N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	28.9' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



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PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-P-03D
LOC Alley behind Mi. Plaza
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY Mundell and Associates
WELL ID MMW-P-03D
CITY Indianapolis
STATE Indiana COUNTRY U.S.A.

LOCATION
In the center of the alley behind Michigan Plaza, approximately 10' S of the Arca de Salvacion.

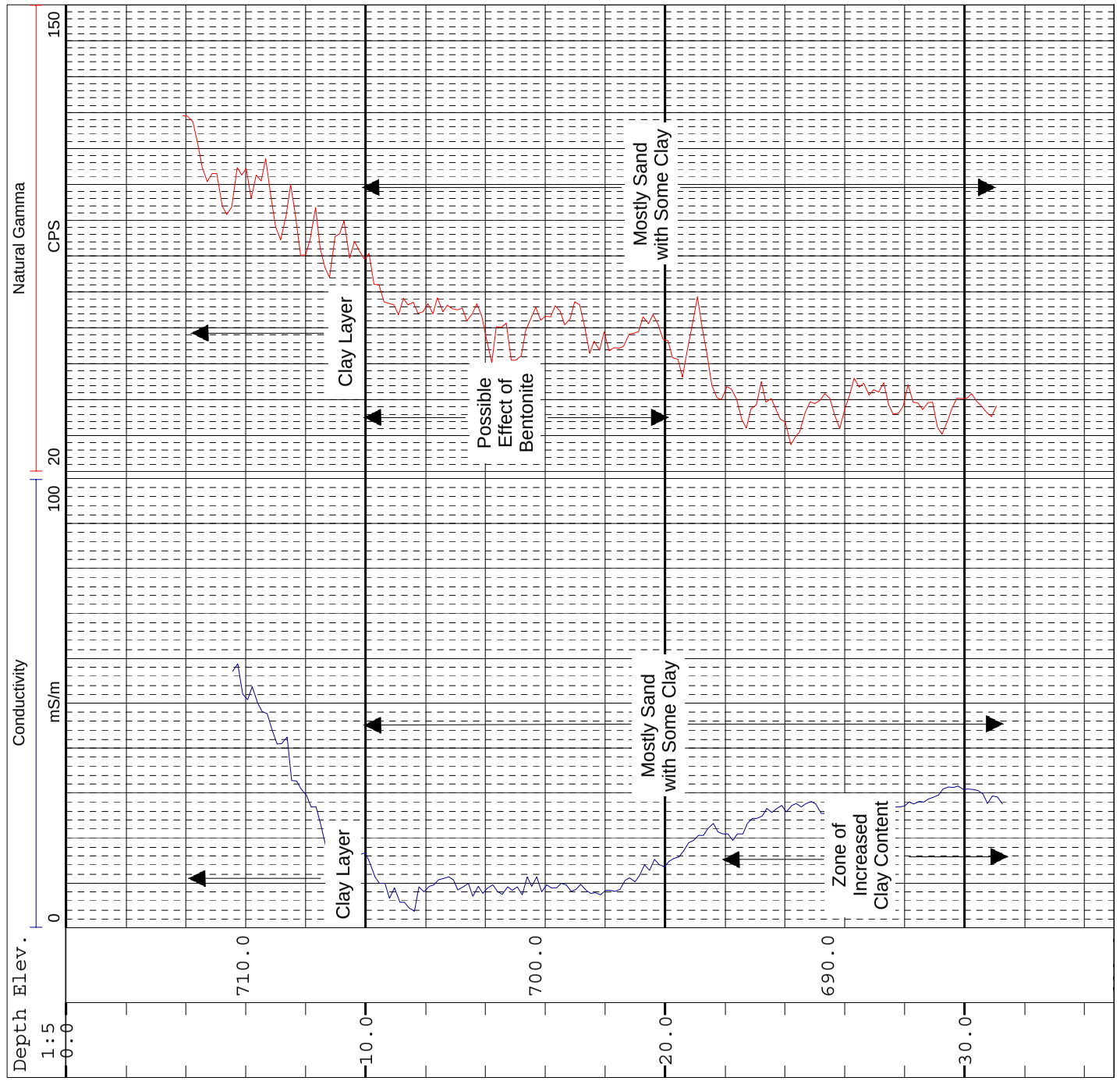
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A		ELEVATION	716.02'	K.B. N/A
LOG MEAS. FROM	TOC		ABOVE PERM. DATUM		D.F. N/A
DRILLING MEAS. FROM	Ground Surface				G.L. N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	31.3' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



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PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-P-07
LOC 75' NW of the Village Pantry
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY Mundell and Associates
WELL ID MMW-P-03D
CITY Indianapolis
STATE Indiana COUNTRY U.S.A.

LOCATION
Approximately 75' NW of the Village Pantry and 50' S of Michigan St.

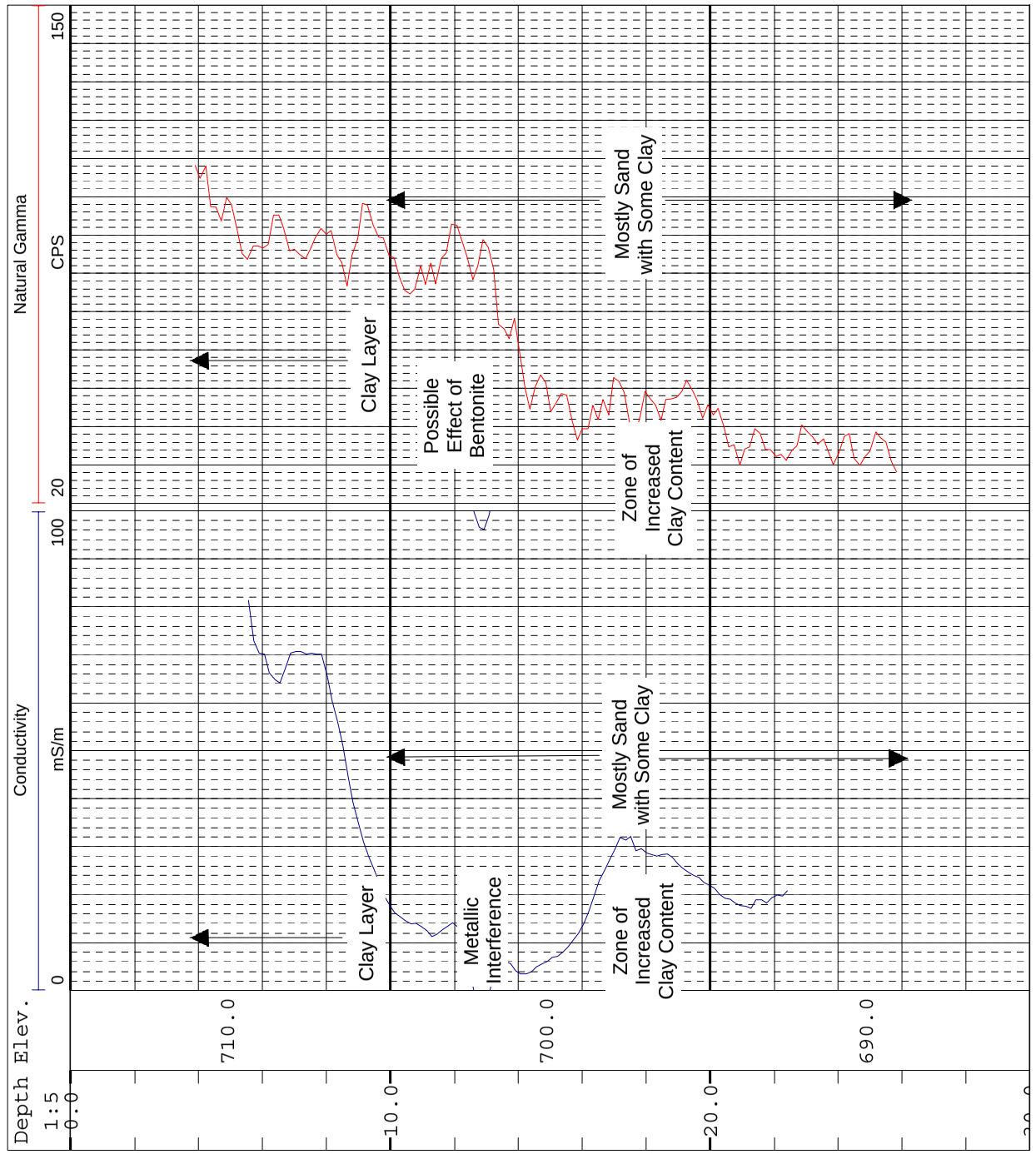
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A	ELEVATION	714.90'	K.B.	N/A
LOG MEAS. FROM	TOC	ABOVE PERM. DATUM		D.F.	N/A
DRILLING MEAS. FROM	Ground Surface			G.L.	N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	25.8' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-P-09D
LOC 15' N of Cossell Road
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY	Mundell and Associates
WELL ID	MMW-P-09D
CITY	Indianapolis
STATE	Indiana
COUNTRY	U.S.A.

LOCATION: Approximately 30' NW of the intersection of Cossell Road and Olin Avenue in the grass.

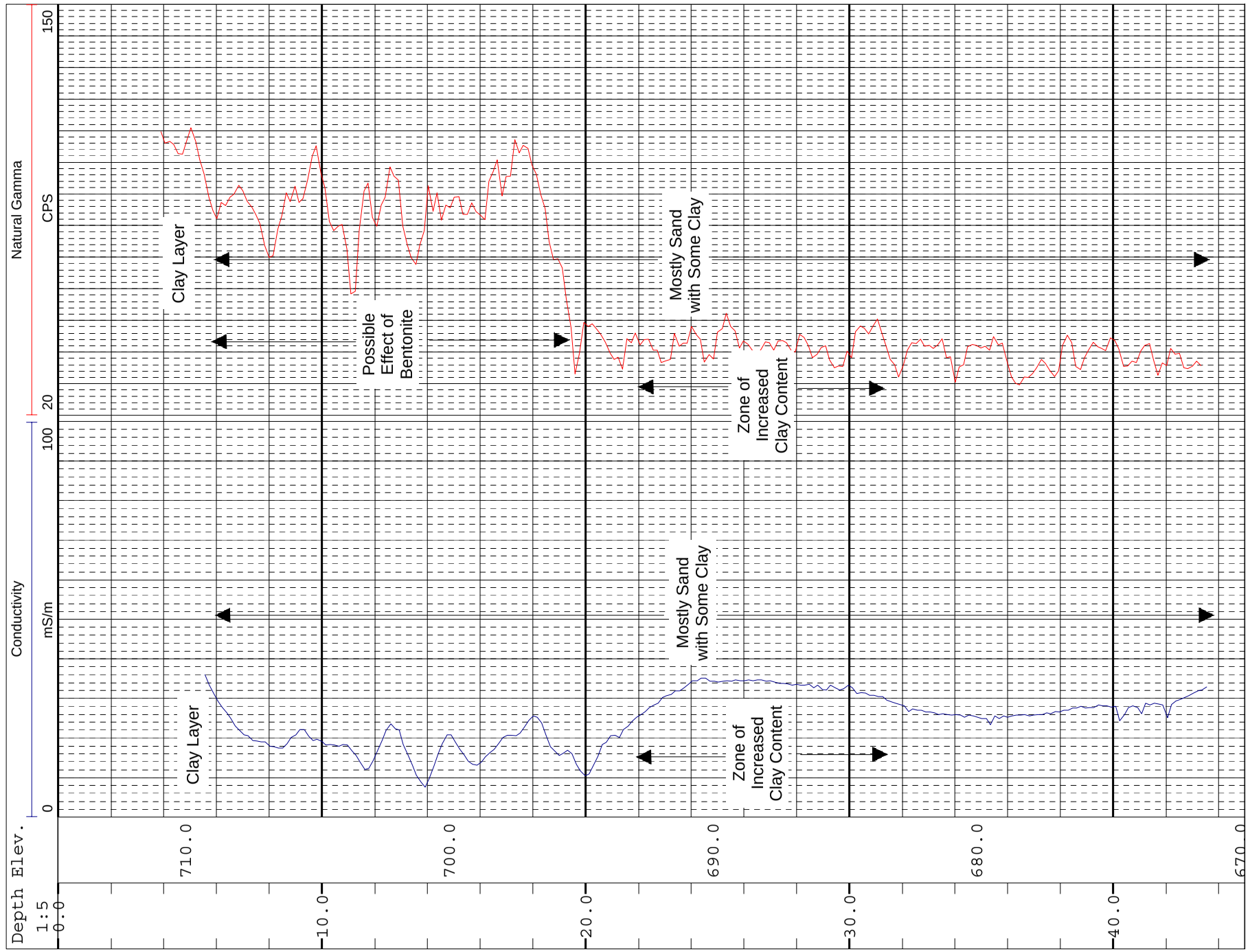
SEC TWP RGE

OTHER SERVICES: EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A	ELEVATION	714.82'	K.B.	N/A
LOG MEAS. FROM	TOC	ABOVE PERM. DATUM		D.F.	N/A
DRILLING MEAS. FROM	Ground Surface			G.L.	N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	43.5' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-P-10S
LOC 75' NW of the Village Pantry
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY Mundell and Associates
WELL ID MMW-P-03D
CITY Indianapolis
STATE Indiana COUNTRY U.S.A.

LOCATION
Approximately 100' NW of the Village Pantry and 70' S of Michigan St.

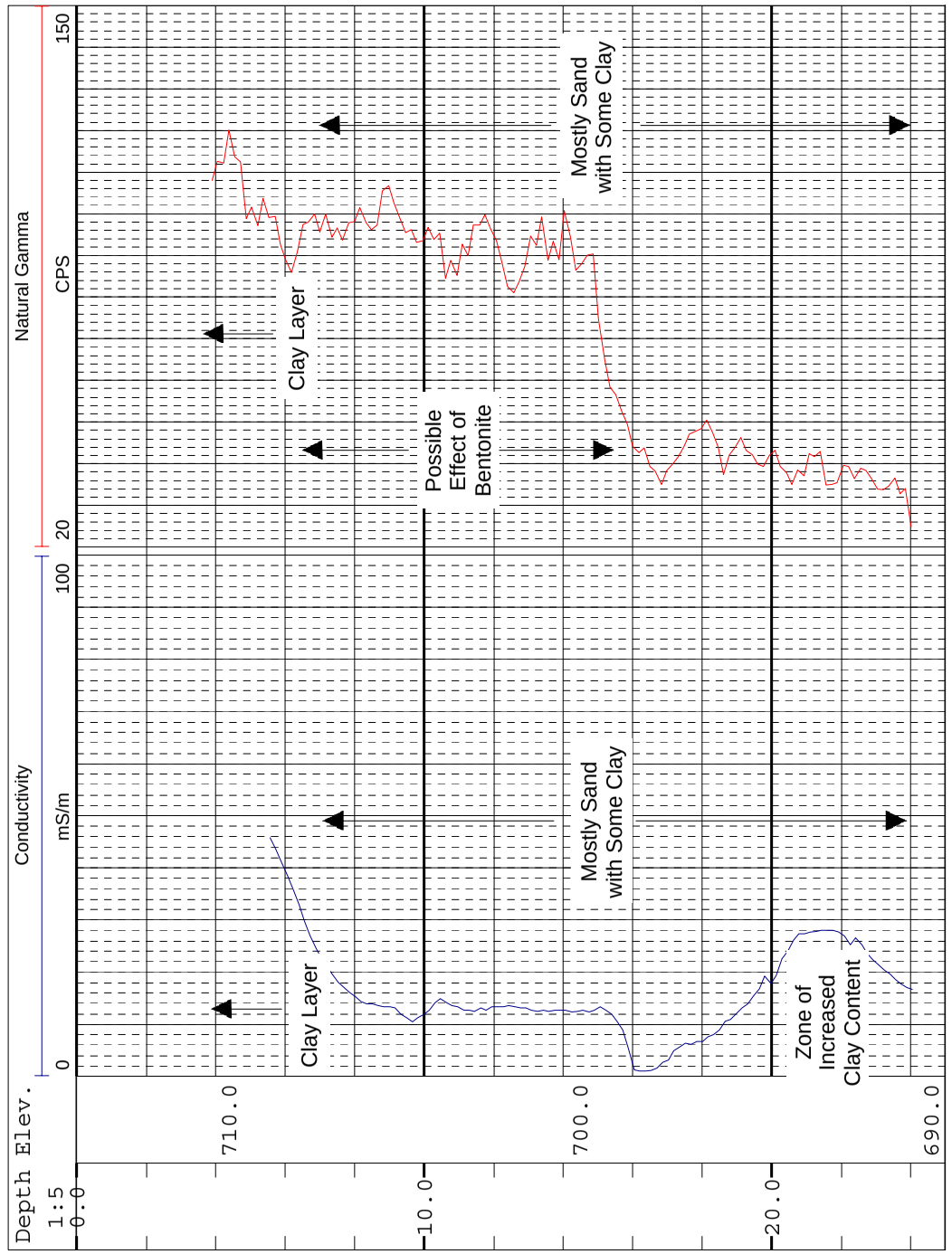
OTHER SERVICES
EM Conductivity and Natural Gamma Logs

SEC TWP RGE

PERMANENT DATUM	N/A	ELEVATION	714.35'	K.B.	N/A
LOG MEAS. FROM	TOC	ABOVE PERM. DATUM		D.F.	N/A
DRILLING MEAS. FROM	Ground Surface			G.L.	N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	24.1' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



Mundell
Consulting Professionals
for the Earth and the Environment

110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-P-10D
LOC 100' NW of the Village Pantry
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

COMPANY Mundell and Associates
WELL ID MMW-P-03D
CITY Indianapolis
STATE Indiana COUNTRY U.S.A.

LOCATION
Approximately 100' NW of the Village Pantry and 70' S of Michigan St.

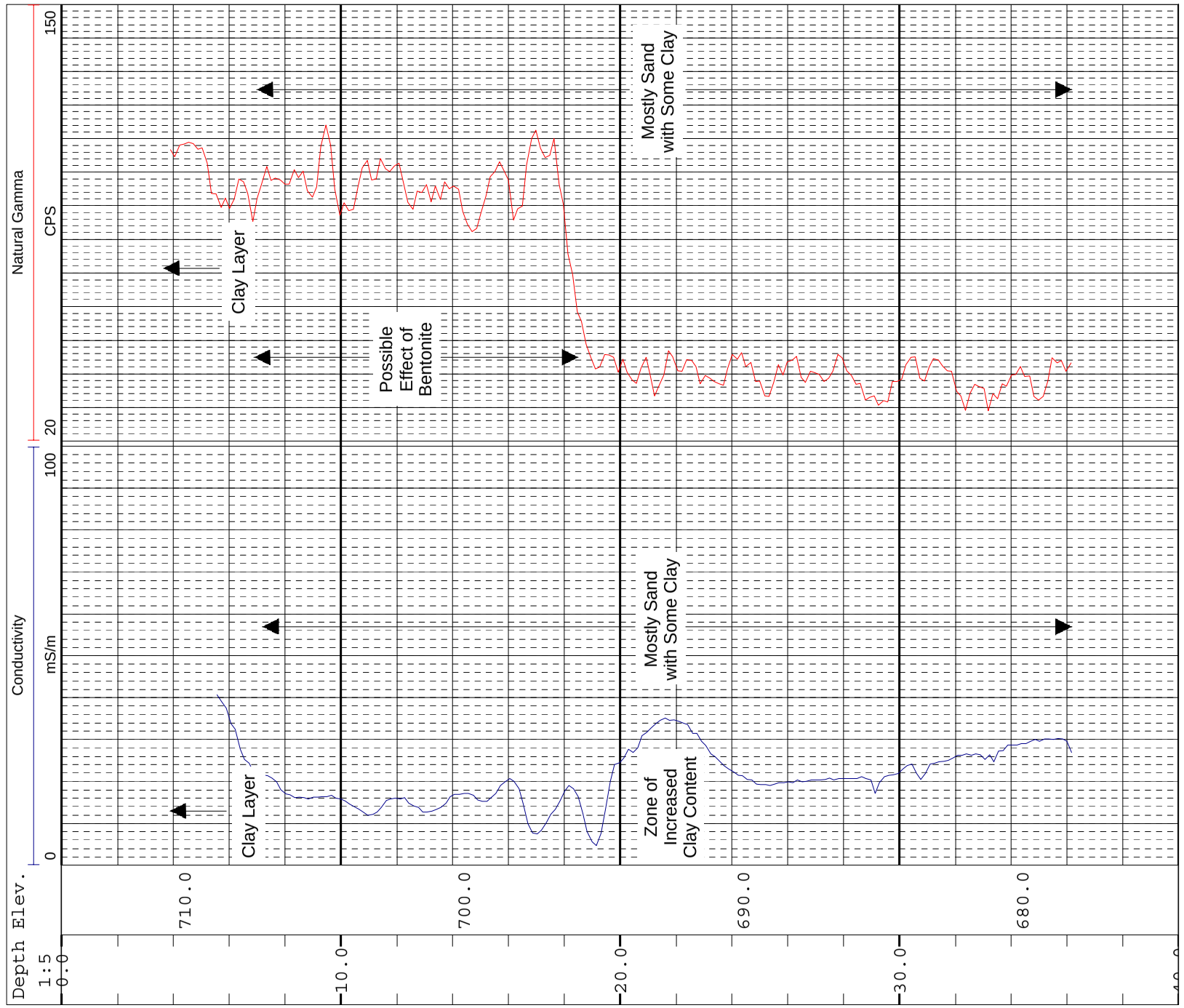
SEC TWP RGE

OTHER SERVICES
EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A		ELEVATION	714.42'	K.B. N/A
LOG MEAS. FROM	TOC		ABOVE PERM. DATUM		D.F. N/A
DRILLING MEAS. FROM	Ground Surface				G.L. N/A

DATE	08/25/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	36.2' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	Pilar Cuadra		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



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110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

PROJECT NAME: Michigan Meadows Apts.
PROJECT NUMBER: M01046

CO Mundell and Associates
WELL MMW-P-12D
LOC 50' N of the Village Pantry
CTY Indianapolis
STE Indiana
PROJECT NO. M01046

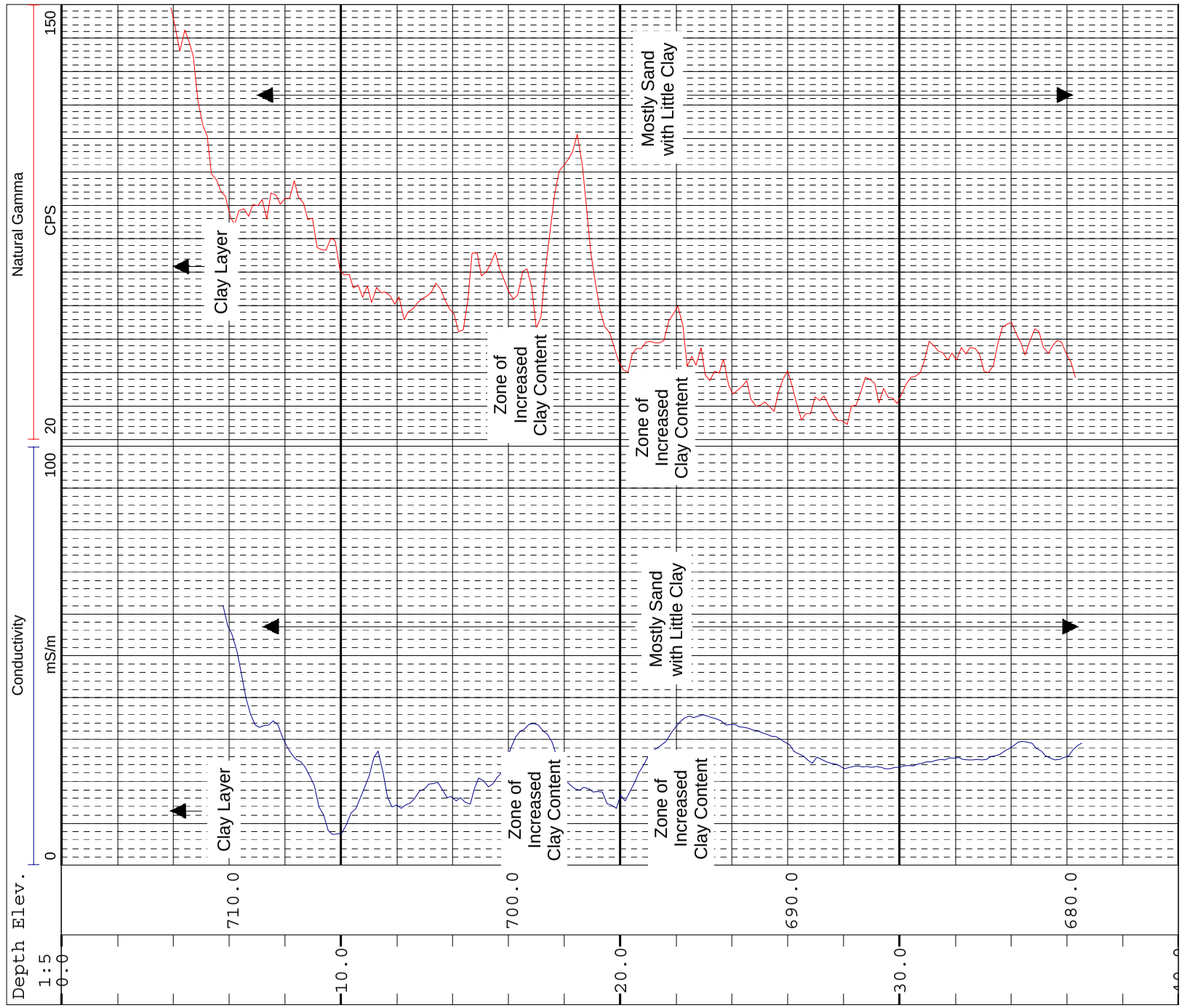
COMPANY	Mundell and Associates
WELL ID	MMW-P-12D
CITY	Indianapolis
STATE	Indiana
COUNTRY	U.S.A.

LOCATION	Approximately 50' N of the Village Pantry and 70' S of Michigan St.
SEC / TWP / RGE	
OTHER SERVICES	EM Conductivity and Natural Gamma Logs

PERMANENT DATUM	N/A	ELEVATION	716.15'	K.B.	N/A
LOG MEAS. FROM	TOC	ABOVE PERM. DATUM		D.F.	N/A
DRILLING MEAS. FROM	Ground Surface			G.L.	N/A

DATE	10/10/11	TYPE FLUID IN HOLE	Water
RUN No		SALINITY	N/A
TYPE LOG	Conductivity, Gamma	DENSITY	N/A
DEPTH-DRILLER	NA	LEVEL	N/A
DEPTH-LOGGER	NA	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	36.3' from TOC	SEAL NUMBER	NA
TOP LOGGED INTERVAL	3.94' from TOC		
OPERATING RIG TIME	N/A		
RECORDED BY	Gabriel Hebert		
WITNESSED BY	NA		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO



APPENDIX D

Revised Work Plan for Third Round of CAP 18 ME™ Injections - July 22, 2011

110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

July 22, 2011

Ms. Erin Brittain
Project Manager
Voluntary Remediation Program
Office of Land Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

Re: **Revised Work Plan for Third Round of CAP 18 ME™ Injections**
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana 46222
IDEM Incident # 0000198
IDEM VRP # 6061202
MUNDELL Project No. M01046

Dear Ms. Brittain:

This *Revised Work Plan for the Third Round of CAP18 ME™ Injections* is being submitted to the Indiana Department of Environmental Management (IDEM) by MUNDELL & ASSOCIATES, INC. (MUNDELL), on behalf of AIMCO Michigan Meadows Holdings, LLC (AMMH), to describe upcoming remediation activities at the Site planned for August 2011. The following sections provide detailed discussions regarding the design of this third and final CAP 18 ME™ injection at the Site. Previous CAP 18 ME™ injections were completed at the Site in August 2007 and February 2009.

The trends of tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride in the areas of the chemical ***Source Areas*** (***A, B*** and ***C***) at the Site have indicated that dechlorination of the chemicals is still occurring (refer to the *Quarterly Monitoring Progress Report – 4th Quarter 2010* dated February 16, 2011, for specific data summaries and figures). The locations of ***Source Areas A, B*** and ***C*** are included in this Revised Remediation Work Plan (**Figure 2**).

Based on a review of the analytical data, it is apparent that complete dechlorination of all of the source PCE has not occurred in ***Source Areas A, B*** and ***C***, as shown in the concentration trends observed in monitoring wells MMW-P-02 and MMW-P-03S (***Source Area A***), MMW-8S

(***Source Area B***) and MMW-1S, MMW-9S and MMW-10S (***Source Area C***). As such, MUNDELL believes that additional enhanced in-situ biodegradation efforts and the injection of additional CAP 18 ME™ product are recommended.

SENTINEL MONITORING WELL INSTALLATION

The Annual Michigan Plaza Site Status Update meeting was held at IDEM on March 23, 2011. Ms. Erin Brittain, Ms. Sarah Finley-Johanson and Mr. Bill Holland of IDEM, Ms. Sarah Webb and Mr. John Mundell of MUNDELL, and Mr. Peter Cappel of AMMH were in attendance.

At the request of IDEM, MUNDELL will install three nested pairs of monitoring wells to monitor remedial progress and indicator compound generation due to the proposed third CAP 18 ME™ injections in the vicinity of ***Source Areas A, B*** and ***C***. The proposed well locations are shown on **Figure 1**. Prior to well installation, soil borings will be advanced approximately 15 ft into the local till. MUNDELL anticipates the boring will extend to a depth of approximately 50 ft based on previously completed soil investigations in the area. Following soil description and screening at the soil boring locations, nested well sets consisting of one shallow and one deep monitoring well will be installed at each location.

The deep monitoring wells, **P-MMW-P-11D, P-MMW-P-12D** and **P-MMW-P-13D** will be installed at the base of the aquifer unit. The 10 foot screened interval will extend to the aquifer/till interface. This location will monitor conditions in the deep aquifer interval. The shallow monitoring wells, **P-MMW-P-11S, P-MMW-P-12S** and **P-MMW-P-13S** will be installed adjacent to **P-MMW-P-11D, P-MMW-P-12D** and **P-MMW-P-13D** respectively, and utilize a 10 foot screen located within the appropriate depth interval to monitor the upper saturated zone of the aquifer for remedial response and daughter product generation. Previous shallow monitoring well installations in the vicinity have ranged in depth from approximately 28 ft to 30 ft. MUNDELL expects these installations to occur at a similar depth range.

All permanent monitoring wells will be constructed of 2-inch diameter, flush joint, threaded Schedule 40 PVC materials. The monitoring wells will consist of 0.010-inch machine-slotted PVC screens, and the shallow monitoring wells (**P-MMW-P-11S, P-MMW-P-12S** and **P-MMW-P-13S**) will be set at or within 2 to 4 feet above the groundwater surface. A sand filter pack, consisting of No. 5 sand, will be installed around the bottom of each screen to a height approximately 2 to 3 feet above the top of the screen. Ten foot PVC screens will be installed in the construction of all monitoring wells. The monitoring wells will be backfilled with bentonite to 1 foot bgs. Flush-mounted, bolt-down steel manhole covers set in place with concrete pads will provide protection and stability to the wells. Watertight well caps will be fitted to each monitoring well to prevent the infiltration of surface water.

All soil cuttings generated during the drilling of the permanent monitoring wells and groundwater pumped out of the wells during well development will be placed in 55-gallon drums

located at the Site for later disposal. In accordance with IDEM guidelines, the contents in each drum will be identified with a label describing them as non-hazardous materials.

These monitoring wells will be incorporated in the quarterly monitoring network starting the third quarter 2011, and the data will be presented in future reports.

CAP 18 ME™ BIOREMEDIATION DESIGN AND IMPLEMENTATION

CAP 18 ME™ Design

The amount and distribution of CAP 18 ME™ needed for each ***Source Area*** was designed taking several factors into account as well as the practical experience of the manufacturers of CAP 18 ME™, the Carus Corporation (Carus). The amount of CAP 18 ME™ to inject into the chemical ***Source Areas*** was calculated using the *CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software* provided by Carus. This software takes into account the treatment area volume (based on plume size) and the soil characteristics (type, bulk density, fraction of organic carbon, total and effective porosity, hydraulic gradient and conductivity). The spreadsheet then calculates the dissolved and sorbed contaminant demand, as well as the background demand from geochemical parameters (i.e., the site levels of dissolved oxygen, nitrate, manganese, iron, sulfate and hardness). These parameters then factor into the stoichiometric demand for hydrogen, and the corresponding amount of CAP 18 ME™ needed for a particular treatment area. Microbial degradation and design contingency factors of safety are considered as well in the calculations. For this site, a factor of safety of 5.3 was selected to allow for degradation and design uncertainties. Spreadsheet assumptions for the calculation of demand for CAP 18 ME™ for each ***Source Area*** are shown in **Table 1**. Computations estimated that approximately 1,700 lbs, 2,000 lbs and 5,700 lbs of CAP 18 ME™ were needed for ***Source Areas A, B*** and ***C***, respectively, based on the cumulative indicator compound concentrations and geochemistry parameters obtained from January 2010 to January 2011.

Several iterations of CAP 18 ME™ injection distribution were evaluated using the *Bioremediation Products Design Software* and considering Site physical features. The first consideration was to determine what type of application would best fit the remaining plume's size and distribution in each ***Source Area*** given the geology, geochemistry and indicator compounds. The saturated zone within each ***Source Area*** has a poorly-graded, medium sand (SP) underlain by a well-graded, gravelly sand (SW). MUNDELL's experience with CAP 18 ME™ in sands at the Michigan Plaza Site confirms that fatty acids that get broken down through beta-oxidation can travel distances as great as 75 ft to 100 ft from the place of injection, thereby allowing "treatment" to continue downgradient as the fatty acids migrate and continue to lend hydrogen atoms for reductive dechlorination. Given this geologic advantage and the plumes being situated as they are in relation to Michigan Street and the Plaza building, it was determined that a 'treatment curtain' design distribution would be effective.

The injection spacing for the selected design is largely determined by the aquifer's ability to receive the product. An injection spacing of 10 ft to 15 ft on centers is considered very effective

for the sands encountered at the Site. Curtain 'rows' stacked three deep are planned for ***Source Area C***, two rows are planned for ***Source Area B***, while a single-row curtain design will be implemented in ***Source Area A***. Curtain areas are generally oriented perpendicular to either the plume or parallel with building walls that control injection accessibility. Additional injection locations are aligned along sewer locations where impacts were previously noted in the vicinity of ***Source Areas A, B*** and ***C***. All planned injection locations are presented on **Figure 2**. This configuration was designed to provide the most thorough coverage per ***Source Area***. After the number of points was established per ***Source Area***, the total oil demand for each ***Source Area*** was divided by the number of points.

Based on previous CAP 18 ME™ injection events at the Site performed in August 2007 and February 2009, several design factors have been implemented. This design accounted for injecting the CAP 18 ME™ conservatively throughout a 12 foot thickness in the upper saturated zone at each injection point in ***Source Area A***, and throughout a 20 foot thickness in the upper saturated zone at each injection point in ***Source Areas B*** and ***C***. These injection thicknesses allow for introduction of the product throughout the sand and gravel aquifer down into the top of the underlying silty clay glacial till, which acts as a barrier to further vertical groundwater movement.

Introduction of the CAP 18 ME™ into the aquifer at 3-foot depth intervals has proven to be the most effective injection strategy during the previous two injection events. In addition, injection of twice as much product into the upper 10 ft of the saturated zone as compared to greater depths places the product in the most impacted zone of the aquifer that is the result of previous releases from the former Accent cleaners.

Health and Safety

MUNDELL will prepare a Health and Safety Plan to ensure that activities for remediation will be conducted with industry standard safety measures, and that the surrounding public would not be threatened by any of the activities the occurred.

MUNDELL will contact Indiana Plant Protection Service (IUPPS) for utility locates in the specific areas being drilled. As a supplement to this utility locate, MUNDELL will also utilize its own geophysics department to provide more in depth locates of utilities and obstructions. Locations will be adjusted based upon the results of these utility investigations as needed.

CAP 18 ME™ Injection Application

CAP 18 ME™ injection remediation activities are anticipated to begin in August 2011. CAP 18 ME™ will be injected into each injection point using the following protocol:

1) At each injection point, the geoprobe will direct push the drill rods down to the bottom depth, as determined by the depth of the lower clay till layer.

2) The total poundage of CAP 18 ME™ loading designed per boring and a conversion of 7.7 pounds per gallon will be used to estimate the amount of gallons required. From this amount, the estimated amount of 3-foot lifts will be calculated, with the bottom lift being just into the clay till, and the top lift being anywhere from 1 to 3 feet above the observed water table (to account for seasonal fluctuations).
3) Calculated volumes of CAP 18 ME™ will be pumped from the 55-gallon drums using a geoprobe grout system, through tubing sealed and connected to the tooling rods down into the bottom of the drill rods, where it is slowly injected under pressure into the formation at the 3-foot lift intervals and loading requirements established above. At completion, each boring will be filled with granular bentonite and capped with either topsoil if in grassy areas, or asphalt patch in the parking areas.
4) greater depths allow for product placement in the most impacted zone of the aquifer.

Table 2 is provided which shows the summary of planned injection quantities for each injection point, and each ***Source Area***. Approximately 1,700 lbs, 2,000 lbs and 5,700 lbs of CAP 18 ME™ are the expected injection masses for ***Source Areas A, B*** and ***C***, respectively.

Vapor Intrusion Assessment

MUNDELL will conduct a baseline sampling event at the residence located immediately west of the Plaza property (3817 West Michigan Street) to determine if elevated levels of volatile organic compounds (VOCs) exist in the ambient air outside of the residence, or the indoor air of the crawl space or living room. Three samples will be collected from the home including ambient outdoor air (**P-AA-1**), crawl space air (**P-CS-1**) and living room air (**P-IA-1**). These proposed sampling locations are included on **Figure 1**.

The ambient air sample will be collected from the residence exterior within the breathing zone. Each of the indoor air and crawl space air samples will be collected from as close to the center of the room or building footprint, respectively, while avoiding areas where sampling would interfere with daily building use. During sampling activities, MUNDELL will document any odors, cleaning supplies, paint cans or any other conditions that could potentially affect the sampling results. Each ambient and indoor air sample will be collected in a 6-liter, inert, stainless-steel Summa canister over a 24-hour period with the pressure and flow rate in each canister being controlled with a pressure regulator. The samples will be delivered overnight to Pace Analytical Services of Minneapolis, Minnesota, and analyzed for U.S. Environmental Protection Agency Method TO-15 for VOCs.

MUNDELL is in the process of obtaining access to the residence located at 3817 West Michigan Street to complete this vapor intrusion assessment. Once access is obtained from the property owner and work plan approval is received from IDEM, MUNDELL will move forward with the proposed activities immediately. MUNDELL will notify IDEM of all planned Site activities as they are scheduled.

We appreciate the opportunity to update IDEM on the upcoming remedial activities planned at the Site. If you have any questions, please do not hesitate to contact us at (317) 630-9060 or via email (jmundell@MundellAssociates.com; swebb@MundellAssociates.com).

Sincerely,

MUNDELL & ASSOCIATES, INC.

Sarah E. Webb, L.P.G.
Project Hydrogeologist

John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

Attachments: Tables
Figures

cc: Mr. Peter Cappel, AMMH

TABLES

FIGURES

TABLES

TABLE 1

CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software

Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

SOURCE AREA A

Treatment Area Volume		ESTIMATION METHOD
Curtain Length	40 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	12 feet	Saturated interval thickness in Source Area A
Well Spacing	10 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.0133 mg/L	Averaged MMW-P-02 groundwater concentrations from Quarters 1-4 ,2010, and Quarter 1, 2011.
TCE	0.00536 mg/L	
DCE	0.0659 mg/L	Averaged MMW-1S groundwater concentrations from Quarters 1-4 ,2010, and Quarter 1, 2011.
VC	0.173 mg/L	
Background Demand		
Oxygen	0.872 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 ,2010, and Quarter 1, 2011. (Wells included: MMW-P-05, MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D, MMW-P-02 and MMW-C-02) (Wells included: MMW-1S, MMW-8S, MMW-9S, MMW-10S, MMW-11S and MMW-12S)
Nitrate	0.14 mg/L	Averaged groundwater concentrations collected Quarter 1, 2011. (Wells included: MMW-C-02)
Manganese	2.0 mg/L	Default Value
Iron	5.25 mg/L	Averaged groundwater concentrations from Quarter 2, 2008. (Wells included: MMW-P-05, MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D and MMW-P-02)
Sulfate	40.3 mg/L	Averaged groundwater concentrations from Quarters 1-4 ,2010, and Quarter 1, 2011. (Wells included: MMW-P-06, MMW-P-03S, MMW-P-03D and MMW-C-02)
Hardness	496.8 mg/L	Averaged groundwater concentrations from Quarters 1-4 ,2010. (Wells included: MMW-P-03S)

TABLE 1

CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software

Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

SOURCE AREA B

Treatment Area Volume		**ESTIMATION METHOD**
Curtain Length	20 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	18 feet	Saturated interval thickness in Source Area C
Well Spacing	10 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.0832 mg/L	Averaged MMW-8S groundwater concentrations from Quarters 1-4 ,2010, and Quarter 1, 2011.
TCE	0.005 mg/L	
DCE	0.0992 mg/L	
VC	0.1894 mg/L	
Background Demand		
Oxygen	1.88 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 ,2010, and Quarter 1, 2011. (Wells included: MMW-8S and MMW-P-08)
Nitrate	1.5 mg/L	Averaged groundwater concentrations collected Quarter 1, 2011. (Wells included: MMW-8S and MMW-P-08)
Manganese	2.0 mg/L	Default Value
Iron	3.5 mg/L	Averaged groundwater concentrations from Quarter 2, 2008. (Wells included: MMW-8S and MMW-P-08)
Sulfate	84.8 mg/L	Averaged groundwater concentrations from Quarters 1-4 ,2010, and Quarter 1, 2011. (Wells included: MMW-8S and MMW-P-08)
Hardness	706.2 mg/L	

TABLE 1

CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software

Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

SOURCE AREA C

Treatment Area Volume		**ESTIMATION METHOD**
Curtain Length	48 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	20 feet	Saturated interval thickness in Source Area C
Well Spacing	12 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.2042 mg/L	Averaged MMW-1S groundwater concentrations from Quarters 1-4 ,2010, and Quarter 1, 2011.
TCE	0.0365 mg/L	
DCE	0.0523 mg/L	
VC	0.0199 mg/L	
Background Demand		
Oxygen	2.27 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 ,2010, and Quarter 1, 2011. (Wells included: MMW-1S, MMW-8S, MMW-9S, MMW-10S, MMW-11S and MMW-12S)
Nitrate	2.66 mg/L	Averaged groundwater concentrations collected Quarter 1, 2011. (Wells included: MMW-9S and MMW-11S)
Manganese	2.0 mg/L	Default Value
Iron	3.5 mg/L	Averaged groundwater concentrations from Quarter 2, 2008.
Sulfate	108 mg/L	Averaged groundwater concentrations from Quarters 1-4 ,2010, and Quarter 1, 2011. (Wells included: MMW-9S, MMW-P-03S and MMW-P-08)
Hardness	634.1 mg/L	

TABLE 2
Proposed CAP 18 ME™ Injection Locations
Including Anticipated Injection Amounts
July 2011

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

SOURCE AREA A		
Injection Point Identification	**Planned Injection Mass (lbs)**	**Planned Injection Volume (gallons)**
26	283	36.8
27	283	36.8
28	283	36.8
29	283	36.8
30	283	36.8
31	283	36.8
SOURCE AREA C: TOTAL INJECTION AMOUNTS	1,700	220.8
SOURCE AREA B		
21	400	51.9
22	400	51.9
23	400	51.9
24	400	51.9
25	400	51.9
SOURCE AREA B: TOTAL INJECTION AMOUNTS	2,000	260
SOURCE AREA C		
Injection Point Identification	**Planned Injection Mass (lbs)**	**Planned Injection Volume (gallons)**
1	285	37.0
2	285	37.0
3	285	37.0
4	285	37.0
5	285	37.0
6	285	37.0
7	285	37.0
8	285	37.0
9	285	37.0
10	285	37.0
11	285	37.0
12	285	37.0
13	285	37.0
14	285	37.0
15	285	37.0
16	285	37.0
17	285	37.0
18	285	37.0
19	285	37.0
20	285	37.0
SOURCE AREA A: TOTAL INJECTION AMOUNTS	5,700	740.3
SITE-WIDE Injection Totals	**9,400**	**1,221**

FIGURES

Michigan Street

P-MMW-P-12S
P-MMW-P-12D
MMW-P-08
MMW-P-07
MMW-P-10S
MMW-P-10D
MMW-P-01
P-IA-1
P-CS-1
MGW-5
Village Pantry (3801)
P-AA-1
MMW-P-06
MMW-P-05
La Pulga (3807/3809)
Tire Shop (3811)
Alcoholics Anonymous (3815)
Arca de Salvacion (3819)
Michigan Plaza Family Laundry (3823)
Holt Road
MW170S
MW170D
P-MMW-P-13S
P-MMW-P-13D
MMW-P-02
MMW-P-04
MMW-C-01
P-MMW-P-11S
P-MMW-P-11D
MMW-P-03S
MMW-P-03D
Floral Park Cemetery
Cossell Road

LEGEND

P-MMW-P-01	Proposed Monitoring Wells (July 2011)
P-AA-1	Proposed Vapor Intrusion Monitoring Points (July 2011)
MW160	Keramida/Environ Monitoring Wells
MMW-P-06	MUNDELL Monitoring Wells, Michigan Plaza (September 2005)
MMW-P-07	MUNDELL Monitoring Wells (January 2007)
MMW-P-09D	MUNDELL Monitoring Wells (May-June 2007)
MMW-C-01	MUNDELL Monitoring Wells (July/August 2008)
MMW-11S	MUNDELL Monitoring Wells (November/December 2008)
MGW-1	MUNDELL Soil Gas Well

NORTH

SCALE
0 100
feet

Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc.
Project No. 2829
March 13, 2002

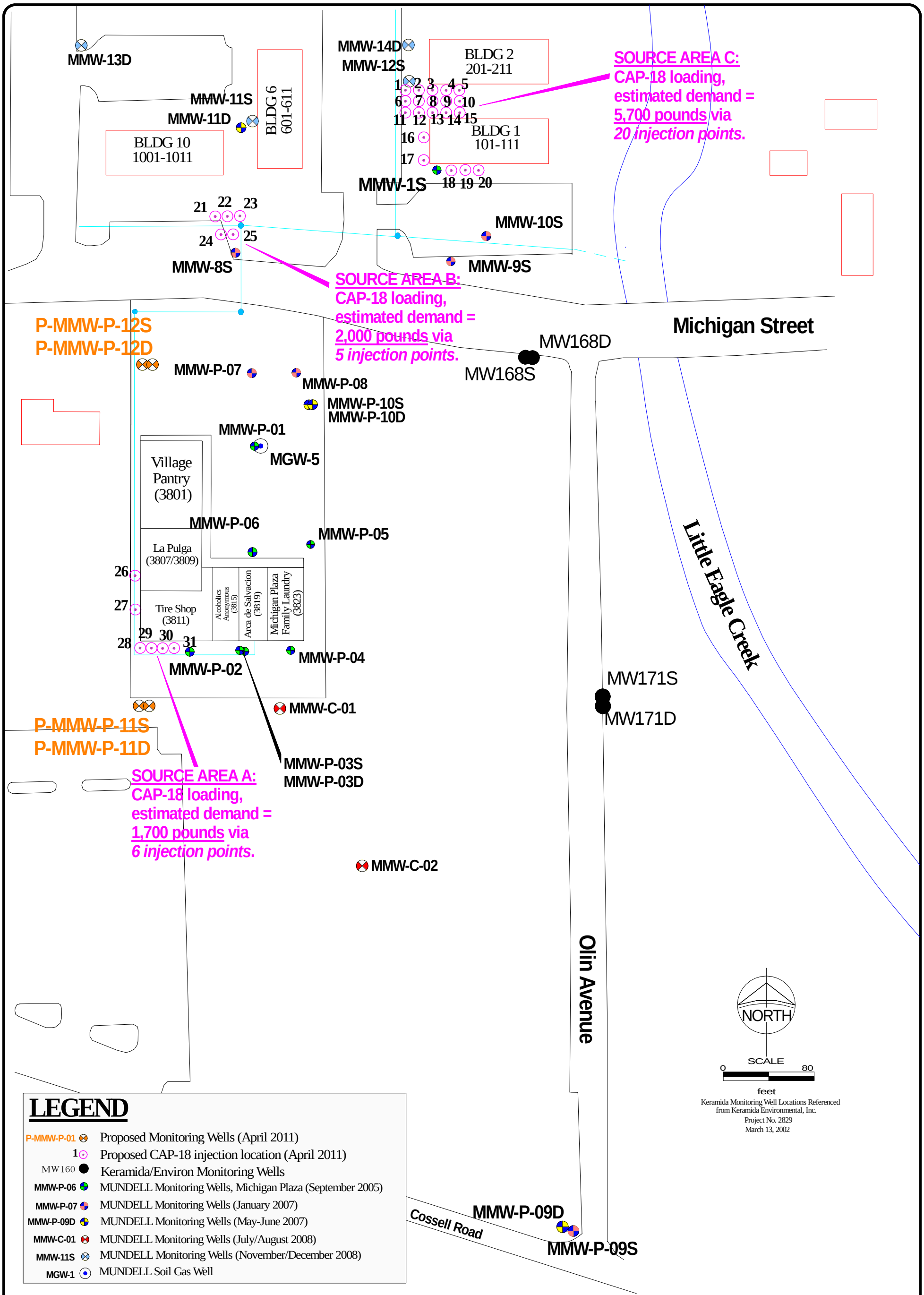
Mundell
Consulting Professionals for the Earth and the Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406
317-630-9060, fax 317-630-9065

Project Number: M01046
Drawing File: Prp_Wells_VI_Pts.skf
Date Prepared: 07/21/2011
Scale: 1"=80'

Proposed Monitoring Well and Vapor Intrusion Monitoring Locations July 2011

Michigan Plaza
3801 - 3823 West Michigan Steet
Indianapolis, Indiana

FIGURE
1



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Project Number:	M01046
Drawing File:	Inj_Pts_Rd3.skf
Date Prepared:	07/21/2011
Scale:	1"=80'

Proposed CAP 18 ME™ Injection Locations July 2011

Michigan Plaza
3801 - 3823 West Michigan Steet
Indianapolis, Indiana

FIGURE
2